THE

AMERICAN REVIEW OF TUBERCULOSIS

ABSTRACTS OF TUBERCULOSIS

VOLUME XIV JULY, 1926 ABST. No. 1

Exairesis of the Phrenic Nerve in the Treatment of Pulmonary Tuberculosis.—Theoretically, avulsion of the phrenic nerve is indicated when there are signs of unilateral, retractile fibrosis, and when the lesions are situated near the base of the lung. This operation, artificial pneumothorax, and thoracoplasty should not be considered as interchangeable operations, to be attempted successively when one method fails, though such a procedure is often justified in practice. Pneumothorax brings about an active collapse of the lung. Thoracoplasty, impratical in acute forms of the disease in which artificial pneumothorax is the treatment of choice, brings about a partial collapse by placing a barrier against the natural working of the lung, and favors fibrosis and spontaneous retraction. Avulsion of the phrenic nerve should be compared in its action to thoracoplasty, but it is much more innocuous than that operation. Its indications may be given as follows: 1. At times the indications, as described, are so clear cut that avulsion of the phrenic may be attempted immediately. 2. More often, avulsion will be tried after other means have failed, not because the indications are confused, but because, thanks to its harmlessness, it may be attempted in any case, the chances of success depending on the degree to which its peculiar indications are present. 3. It may be considered as a complement of a partial pneumothorax or of a thoracoplasty which does not compress the base sufficiently. 4. Some authors consider it the first step of a thoracoplasty, in order to show the aptitude of the lung for retractile fibrosis. While this is theoretically ideal, the avulsion operation will often be sufficient, especially if the patient is so situated that prolonged medical supervision is possible. 5. Its minimum of seriousness permits its consideration when neither pneumothorax nor thoracoplasty are to be thought of as, for example, in the case of fibrous tuberculosis without fever and in good general condition, but with indications of a possible return of active disease (occasional bacilliferous expectoration, and occasional fever). 6. The small amount of interference of this operation with the lung area arouses the temptation to disregard the rule as to unilateralness of lesions, and to intervene in bilateral ulcerative forms if it can be demonstrated that the disease is advancing on only one side. 7. Finally, it is indicated in bronchiectasis, when the cavities are close to the diaphragm. A review of anatomy and a study of cadavers reveal that the phrenic nerve originates from the fourth cervical segment, and emerges between the third and fourth cervical vertebrae on the external border of the upper portion of the scalenus anterior muscle, which it then crosses. Its origin is often complex, with small branches from the third and fourth cervical roots, and there are numerous other anastomoses which make it essential to perform avulsion to break them, rather than simple resection of a portion of the nerve. Otherwise there may be regeneration, and paralysis and atrophy of the diaphragm will not take place. As the nerve enters the mediastinum it receives a small filament from the ansa hypoglossus which is not constant, a transverse filament from the large cervical sympathetic, another from the inferior cervical ganglion of the same nerve which probably carries centripetal fibres that furnish sensory innervation of the pleura, and finally a branch from the nerve to the subclavius muscle, the most important, since it carries the accessory motor filament to the diaphragm. Ruhemann, in a study of 17 cadavers, found accessory motor filaments in 11, which passed three times by the subclavian nerve, twice

by the subclavian and other anastomoses, but six times constituted an independent trunk descending in the mediastinum parallel with the phrenic nerve with which it finally anastomosed above the hilum of the lung. Gentle avulsion of the nerve breaks all these anastomoses, and is the only sure way of getting paralysis of the diaphragm. Three weeks after the operation the diaphragm becomes transformed into a fibrous membrane. The operation is described in five stages: *First*, following local anesthesia with 1 per cent novocain and adrenalin, an incision 4 to 5 cm. long, parallel to the natural lines of the skin, is made a finger's breadth above the clavicle, its centre corresponding exactly to the lateral edge of the clavicular insertion of the sternomastoid muscle. Skin and superficial fascia are cut, and sternomastoid muscle retracted. *Second*, the deep sheath of a muscle is split vertically, care being taken to avoid the internal jugular vein. The middle aponeurosis and the central tendon of the omohyoid are masked by fatty tissue which must be carefully pushed aside. *Third*, the tendon of the omohyoid is pulled up by a retractor after the middle aponeurosis is opened. This relieves tension on the muscle and avoids tearing filaments of the ansa hypoglossus. The field is thus well exposed, permitting ligature of the ascending or transverse cervical artery which crosses the fatty tissue filling the space between the middle aponeurosis and the scalenus anterior muscle. It is best to use the finger as a guide in this tissue and feel the artery and muscle, and use blunt dissection. The phrenic nerve can then be seen shining through the sheath of the muscle. *Fourth*, the sheath of the muscle is incised longitudinally, the nerve identified, a few drops of anesthetic injected into the nerve sheath, and the nerve cut below this. The distal end is grasped firmly with a Kocher clamp, and the nerve gently extracted by rolling it on the clamp. The patient generally complains of dull pain in the epigastrium and sharp pain in the shoulder. *Fifth*, the wound is carefully dried, and the muscles return to their original position of their own accord. Drainage is generally unnecessary. The skin is carefully approximated with catgut, and fine silk sutures. There are five cases described, one in detail, in which marked success was obtained with avulsion of the phrenic nerve. The case was that of a woman who three years previously had been diagnosed as having advancing ulcerative tuberculosis of the right upper lobe with a large cavity. Pneumothorax, at first successful, had to be given up because of the development of fluid and the obliteration of the pleural space by adhesions. After three years she was much worse, with loss of weight, bacilliferous expectoration, a new smaller cavity in the right lung, râles throughout this lung, and laryngitis. The left lung appeared unaffected. The patient had signs of marked retractile fibrosis. The operation was well borne. The diaphragm appeared immobile the day after operation, the toxemia was soon gone, the laryngitis improved, expectoration diminished, and, eight months afterward, there was only one tubercle bacillus per field in the sputum. The larger cavity was reduced one-third and the smaller disappeared entirely. The patient gained 5.5 kgm. in weight in eight months. The second, third and fourth cases were failures, but they had no signs of retractile fibrosis and there were large apical cavities. In the fifth case, there was a large cavity at the right apex, gradually increasing over three years, and pneumothorax had failed. Although there was no indication of retractile fibrosis, the immediate result to date of avulsion of the phrenic nerve was good. As to the results obtained by this operation in general, they may be compared with other plastic operations. Often, however, they are not as complete. There is a large zone between the favorable and unsuccessful cases in which symptoms are ameliorated. The inconstancy of the results is attributable to either incomplete avulsion or poorly chosen indications. It should be used by phthisiologists because it is very successful in well-chosen cases, it is innocuous, and finally, because in phthisiotherapy measures should not be too severe.—*L'exérese du nerf phrenique dans le traitement de la tuberculose pulmonaire, C. A. Perret, C. A. Pirquet and A. Giraud, Presse Méd., April 11, 1925, no. 29, 466.*—(*E. H. K.*)

Indications and Contraindications of Artificial Pneumothorax in Pulmonary Tuberculosis.—Forlanini has very concisely expressed the indications for artificial pneumothorax as being whenever life is menaced by the extension of a local (pulmonary) lesion. *Method of cure by pneumothorax:* Our knowledge is largely indebted to the autopsy work of Forlanini, Graetz, Kistler, Warnecke, Burnand and Lindblom. In general, one finds in the collapsed lung at autopsy no evidence of recent evolution, except that in subjects dead of acute generalized disease there may be a few miliary tubercles, but much fewer than in the other lung. Section of the collapsed lung invariably shows a marked and extensive sclerosing process and even cavities may be obliterated by dense connective tissue. Microscopically, the connective tissue seems to

invade the pleura and the perivascular and peribronchial tissues, but its development is gradual, and proliferative changes are seldom marked in lungs collapsed less than six months. Physiologically, functional rest is the most important factor, pneumothorax acting like a veritable plaster jacket for the lung. The suppression of air circulation also checks the flow of septic material and the dangers of aspiration. The approximation of cavity walls places them in a more favorable situation to heal. The nutritive circulation of the collapsed lung through the bronchial vessels is unimpaired but the pulmonary circulation is much diminished, the diminution being proportional to the duration and degree of compression. There is a corresponding marked slowing of the lymphatic circulation, which results in a more or less rapid disappearance of the tuberculous intoxication with its fever, sweats, anorexia, wasting and asthenia. There is no question concerning the production of antitoxins or of vaccination, but simply a better local defense, thanks to a lessened absorption of toxins and augmentation of sclerosis. *Indications:* The modern tendency is to intervene sooner, especially in extensive localized ulcerative forms and caseous congestive forms, as well as certain fibrocaseous forms. At times there is a very striking effect on acute pneumonic and bronchopneumonic forms, but unfortunately recurrences and generalizations are frequent. Hemoptysis demands insufflation whenever it is considerable and not controlled by other measures. Considerable amounts of air under positive pressure may be required, but as these are not well tolerated the substitution of oxygen is recommended, as it is rapidly absorbed. In certain cases a spontaneous pneumothorax should be maintained, but not in the presence of persistent pulmonary fistula. Tuberculous empyema is best treated by puncture and repeated insufflations. Serofibrinous pleurisies cure better and more rapidly with fewer adhesions if aspirated and replaced by gas. Dumarest advises this as soon as the hyperacute phase has passed. *Contraindications:* A very feeble general resistance is a contraindication, also a tendency to extension of the tuberculous lesions outside of the affected lung. Barlow and Kramer have used double simultaneous partial pneumothorax, but marked amelioration in such cases is exceptional. Among other general contraindications are myocarditis associated with chronic intoxication, cardiovascular hypoplasia, emphysema and generalized bronchitis. There are also certain extramedical, moral or social conditions to be considered. Too cold a climate is unpropitious, or too high an altitude. One must be prepared to continue the treatment for a sufficient time—one or two years or more.—*Indications et contre-indications du pneumothorax thérapeutique dans la tuberculose pulmonaire, De Vloo, Rev. Belge d. l. Tuberc., March, 1925, no. 3, 76.*—(*A. P.*)

Artificial Pneumothorax in Pulmonary Tuberculosis.—There are certain dangers in inducing artificial pneumothorax which one must know about if this type of therapy is to be used, but these should not discourage one from using the procedure. Out of 12,000 refillings in carefully selected patients, no serious or unfortunate accidents occurred, because if the patient seemed not to be doing well, with the tuberculosis on the other side, the pneumothorax was lessened or discontinued.—*Zur Diagnose der Lungentuberkulose, nebst Bemerkungen über den künstlichen Pneumothorax, H. Maendl, Wien, klin. Wchnschr., December 18, 1924, xxxvii, 1313.*—(*H. S. W.*)

Appraisal of Artificial Pneumothorax.—Following a period of pessimism after Laennec and Morton, there was an epoch when tuberculosis was called the most curable of maladies. More recently, however, as learned from statistics and observation of patients over a number of years, we are led to believe that tuberculosis is most serious, that the sanatorium is not an absolute factor of cure, that in chronic tuberculosis half of the patients die in two to ten years, and that repeated extension plays a very important rôle. In an attempt to better this situation artificial-pneumothorax treatment was instituted. This treatment is given preferably in the sanatorium. First among the objections to artificial pneumothorax is the small percentage of cases in which it is used; Dumarest estimates 6 per cent, Poix 5 per cent, Kindberg 6 to 12 per cent, and Armand-Delille 9 per cent. These low figures which indicate that it is rather a method of exception, emphasize the rarity of unilateral lesions. In the majority of pneumothorax cases ending fatally, lesions are found on the opposite side. The technique offers no difficulty, though accidents may rarely occur. As to the instrument of choice, simplicity should be the ideal. Why some operators give only 300 cc. at initial insufflations, while in the treatment of hemoptysis they advise 2 to 3 litres is not understood. Complete and perfect collapse has been obtained with one initial insufflation of one litre. The quantity depends not only on the pressure but also on the reaction of the patient. Pleural effusions occur especially in those who have adhesions, and

these same adhesions help to make them benign. At times serous or even purulent effusions are very well borne, but they are a matter of considerable uncertainty. Finally, the repeated treatments necessary and the long time required (2 to 3 years) are serious objections, because sanatorium care is essential at the same time and the cost is very great. In spite of these difficulties and the fact that the treatment does not shorten the illness, nor cure it, it is useful to stop a menacing, advancing process, and in certain cases it enables patients to work much earlier than they could have otherwise. In the future, it is recommended that the indication for artificial pneumothorax be extended to more early and hopeful cases, and it is hoped that such an application may shorten the period of treatment. True caseous pneumonia should not be treated in this way because the consolidated area is too firm. As to its use in hemoptysis, the method is rather heroic, because hemoptyses stop of their own accord and because autopsies show that cavities are frequently incompressible, on account of adhesions. Exceptionally, indications for pneumothorax may be found in the cardiac patient, in the diabetic, and during pregnancy.—*Le pneumothorax artificiel. Ses raisons d'etre, ses difficulties, son avenir, E. Pallasse, Prog. Méd., November 8, 1924, no. 46, 699.*—(*E. H. K.*)

Successful Double Artificial Pneumothorax.—Double artificial pneumothorax was administered for bilateral pulmonary tuberculosis, and in spite of complete collapse the patient was not in discomfort, and his condition was much improved. Respirations were 16 per minute. The vital capacity was moderately reduced.—*Double pneumothorax thérapeutique efficase, tolérance parfaite malgré un collapsus bilateral complet, E. Coulaud, Meeting, Soc. Méd. des Hôpitaux, May 15, 1925, reported in Presse Méd., May 20, 1925, no. 40, 664.*— (*E. H. K.*)

Artificial Pneumothorax in Pulmonary Tuberculosis in Childhood—During the past year artificial pneumothorax was begun on 39 cases, and discontinued in 6 because of adhesions. Twelve of the remaining 33 were in very good condition. They gained weight, their temperature became normal and their sputum negative. Ten continued to have positive sputum, but were in satisfactory condition otherwise. Fluid occurred in 25 per cent of the cases. Of 18 old cases treated for two or three years, 15 are absolutely cured, with normal restitution of the lung as verified by X-ray. It is concluded that because of these good results, and the well-known tendency of tuberculosis in childhood to advance rapidly, artificial pneumothorax should be attempted early when it is demonstrated that the disease is unilateral.—*Contribution à l'étude du pneumothorax thérapeutique dans la tuberculose infantile, P. Armand-Delille, R. Lévy and J. Marie, Meeting, Soc. Méd. des Hôptitaux de Paris, March 13, 1925, reported in Presse Méd., March 18, 1925, no. 22, 357.*—(*E. H. K.*)

Evolution of Tuberculosis in Lungs Collapsed by Artificial Pneumothorax.—This is a study of 25 cases of artificial pneumothorax which have come to autopsy at the Laennec Hospital, Paris. The duration of treatment was from sixteen days to thirty months. The autopsies are described in detail and the following general observations noted: Of the 25 cases, 18 died during the first year, of whom 14 succumbed during the first six months; 6 died during the second year and only one during the third year. One may say that when the treatment fails matters go badly quite early, as a rule. Most of the deaths were due to the bilateral character of the lesions. In five cases death was due to other causes, such as acute nephritis, acute generalized peritonitis, tuberculosis of the suprarenal capsules, intestinal and peritoneal involvement, and fatal hemorrhage of unknown etiology from the contralateral lung. Six cases died from perforation of the collapsed lung. Protocols of certain cases indicate that at times artificial pneumothorax is powerless to stop in the slightest degree the extension of the lesions, which progress inexorably in the collapsed lung. In 4 cases there was a striking miliary seeding of the uncollapsed lung, in contrast to the collapsed lung in which atelectatic but otherwise normal tissue showed little or no miliary disease. The microscopic study of the cases which were under treatment for reasonably long periods presented certain interesting findings. Almost always, whether with or without the development of pleural effusion, but principally when effusion had existed a long time, there was a very dense pachypleuritis developing through a progressive organization of the new membranes formed on the surface of the serosa. As for the lung proper, practically all sections showed a certain number of young early lesions, even in cases the furthest advanced toward cure. This fact would be an argument for great caution in discontinuing treatment on the basis of a cure having been attained. Healthy lung parenchyma, rendered atelectatic by no matter how long a compression, never showed any sclerosis: pulmonary

sclerosis, with its profoundly altered tissue in which well-developed vascular dilatations are often seen, even to the point of giving to the tissue an angiomatous appearance, does not exist in the nondiseased portions of the collapsed lung. Healthy parenchyma escapes these changes. It was not possible in any case to trace the healing of lung cavities. They were flattened out, with smooth, fibrous, clean walls. They were found in the midst of collapsed parenchyma, showed caseous tubercles here and there, and histologically presented nothing out of the ordinary. One case seemed to show a *restitutio ad integram* of a pneumonic lesion. On the whole the author agrees with others that pneumothorax, in the favorable case, checks the progress of the lesions, favors their organization and opposes the development of new lesions in both the collapsed and contralateral lungs. It favors a slowly progressive sclerosis which increasingly walls off the tuberculous lesions, thus checking the diffusion of bacilli. In this curative process the pneumothorax acts by putting the lung at rest and limiting its functional activity. That the bronchi and alveoli are not shut off completely by the collapse has been demonstrated by injecting the collapsed lung with lipiodol which, under the fluoroscope, is found often to have filled them to their terminations. But the circulating air must be stagnant, and while new tubercles may form from bronchial emboli their number must be considerably curtailed. As to circulation of blood in the collapsed lung, the author is definitely of the opinion that there is a relative anemia and not a congestion. This point of view is supported by the frequent good effect of collapse in hemoptysis, by the recent work of Hilton on the oxygen content of the blood in artificial pneumothorax, by the 4 cases cited earlier in which the contralateral lung became seeded with miliary tubercles while the collapsed lung remained practically free, and by the absence of any evidence of congestion macroscopically or microscopically after autopsy.—*Evolution anatomique des lésions dans le poumon collabé par le pneumothorax artificiel, Rolland, Ann. de Méd., April, 1925, xvii, no. 4, 327.*—(*W. B. S.*)

Patency and Permeability of Air Passages in Artificial Pneumothorax.—It is recalled that Lindblom, from necropsy evidence including careful histological examination of 15 pneumothorax cases, concluded that lung compression did not prevent the possibility of dissemination of the lesions by the lymphatic and bronchial routes. Still, the possibility, especially in the case of the bronchi, has been viewed with skepticism because of the extraordinary resistance of their walls to penetration by infection and the difficulty which infectious material must have in reaching collapsed alveoli and acini. This theory presupposes that the finer subdivisions of the bronchial tree must remain open and permeable, a notion apparently contradicted by our ideas of the anatomical and physiological changes which take place and the pathological finding of densely carnified tissue reduced to very small size. In order to test the matter, intratracheal injections of iodized oil were resorted to in patients subjected to pneumothorax treatment. The injections were made after anesthetization of the upper respiratory tract with 10 per cent cocaine with the aid of a mirror, and of the trachea with 1.5 cc. of 2 per cent cocaine instillations. Subglottic injections were made slowly with the patients in horizontal position and breathing deeply. Lafayette's lipiodol was employed, 20 cc. of a mixture of 3 parts lipiodol and 1 part carnation oil sufficing. The injection appeared to cause no ill effects other than recrudescence of expectoration of temporary duration. Some interesting facts were observed. The injection of cavities, contrary to expectation, is difficult, because of their site in the upper lobe, the obstruction of the communicating bronchi by secretions, and the lack of aspiration force through these bronchi, due to the semirigid walls of the cavities. In general, however, the shadows of the lipiodol in the bronchial tree, as shown by roentgenograms, extended well out to the periphery and finer subdivisions, even in lungs well collapsed, and in several instances under a positive intrapleural pressure. *Conclusions:* 1. In the course of ordinary pneumothorax treatment the production of bronchial emboli in the collapsed lung is not precluded, and it is believed that such bronchial emboli are the usual cause of foci of new formation in this lung. This fact, however, should not diminish our confidence in the efficacy of pneumothorax. 2. Our conceptions of the mode of action of therapeutic pneumothorax must be somewhat revised, especially as regards the effacement of the lumen of bronchi and alveoli, the approximation of cavity walls, and the suppression of air circulation. More consideration must be given to changes in the arterial, venous and lymphatic circulations. It must be admitted that complete immobilization is not a necessity. The good effects often noticed at the very beginning of pneumothorax treatment, before there is any real immobilization, cannot be explained on this basis. It is also demonstrated that the mere production of positive intrapleural pressure will not necessarily

produce either immobilization or change the architecture of the lung. 3. The facts noted furnish a new argument for the abandonment of positive pressures except for very definite indications. The optimum pressure is that which will best produce the clinical results desired whether the lung be completely or incompletely collapsed, with pressure positive or negative. Giraud and de Reynier are somewhat skeptical about the attainment of selective collapse, but believe their results show that partial collapse is at any rate as safe a measure as a complete one. 4. The partial persistence of respiratory function in the collapsed lung indicates the need for the usual hygienic measures in addition to pneumothorax. 5. The possibility presents itself for the introduction of therapeutic substances into the interior of the diseased lung. 6. Further pathological and physiological research is desirable, and should be so planned as to yield real information. It is especially desirable that more autopsies, especially in old long-standing pneumothorax cases, should be obtained and carefully performed.—*La perméabilité des voies aériennes persiste-t-elle dans le poumon comprimé par la méthode de Forlanini? A. Giraud and L. de Reynier, Rev. d. l. Tuberc., January, 1925, vi, 5.*—(*A. P.*)

Vital Capacity in Artificial Pneumothorax.—That there is a relation between the structural involvement of lung tissue and vital capacity has been known since Hutchinson's observations, but that the recuperation of pulmonary function is possible in the face of impairment of pulmonary integrity is deserving of clinical recognition and study. The modifications of respiratory capacity during the course of therapeutic pneumothorax are interesting and informative. The same quantity of air introduced into the pleural cavity produced different results under different circumstances. *Modifications in various types of pneumothorax;* In a previous article Bendove has distinguished three types of induced pneumothorax: (1) expansile pneumothorax, (2) static pneumothorax, and (3) compression pneumothorax, to which he now adds a fourth, localized pneumothorax. The smallest variations in vital capacity occur in the last type, but on a larger scale the same principles hold true in compression pneumothorax if the mediastinum remains rigid. There is no ingress of air into such a compressed lung, which contains only the "minimal air" entrapped in the alveoli, and this eventually is absorbed. Thereafter, the spirometric readings change very little following or between refills and bear no relation to the amount of air introduced. In static pneumothorax, however, the vital-capacity readings are influenced by insufflations, but less so than in expansile pneumothorax, in which each insufflation causes a reduction of the vital capacity, but never to the extent of the amount of air introduced. *Residual air of collapsed lung and vital capacity:* This ordinarily approximates 1000 cc. or more. There is an inverse relation between vital capacity and residual air. The latter has been found to be increased in early cases of pulmonary tuberculosis when the vital capacity is diminished. Emphysematous patients have a large residual air and lowered vital capacity, whereas in athletes the reverse is true. In pneumothorax some of the residual air is driven out of the lung and becomes an integral part of the vital capacity in expansile pneumothorax. *Effect of inspiratory and expiratory pressures on the vital capacity:* The introduction of air into the pleural cavity increases the inspiratory intrapleural pressure, impedes expansion of the lung and thus curtails the complemental air. However, the increase in expiratory pressure drives more air out and increases the supplemental air. The total effect is to reduce the vital capacity by the diminution in complemental air minus the residual air expelled. If the pleural pressures are not much reduced the vital capacity as a rule is little altered, but when the inspiratory pressure is brought up to about the atmospheric, cutting out practically all the complemental air, the reduction is considerable. Cases with a labile mediastinum show a nearly stationary expiratory pressure but a markedly reduced inspiratory one and a very low vital capacity. In compression pneumothorax, with a rigid mediastinum, insufflations scarcely affect the vital capacity, the lung taking no part in respiratory function. *Effect of pathological and physiological status of the lung on vital capacity:* In any infiltrative condition expansibility is the first to suffer, contractility remaining intact and tending toward atelectasis. In emphysema the reverse obtains. Infiltrated and caseous areas collapse at once; fibroid areas yield but slowly, but once "caved in" remain so, although uninvolved portions continue to show respiratory movement. Diseased edematous areas containing but little air require less pressure to render them airless. The gas accumulates mostly around these areas during inspiration, being more evenly distributed on expiration. In such cases a small amount of air introduced often increases rather than decreases the vital capacity, the expiratory recoil of the lung being facilitated without expansion of the sound areas being particularly affected. Once the expansibility of the lung is inhibited

or injured, it cannot be entirely regained. This is seen in patients whose lungs have been long kept compressed under high intrapleural pressures. Fluid, if not removed in time, especially injures lung expansibility. Charts are shown exemplifying the effect on the vital capacity of timely removal of fluid, and this is the best argument for aspiration and replacement by air, which is much easier to manage, exerts less compression and is more quickly absorbed, besides distributing itself according to pneumodynamics, that is, mostly around any diseased areas, while fluid tends to collect around the basal lobe. Replacement of aspirated fluid by air was observed to invariably increase the vital capacity. *Diaphragm and mediastinum in relation to vital capacity:* The diaphragm is of great importance in compressing the lower lobe during expiration. The mediastinum affects chiefly the vital capacity of the untreated lung. In the presence of a labile mediastinum no compression pneumothorax can be obtained without marked respiratory distress and dyspnea, as the other lung is also compressed and embarrassed. Fortunately, most patients requiring high intrapleural pressure have a rigid unyielding mediastinum. The vital capacity of the contralateral lung is also affected by the compensatory ability of the heart. *Hemodynamics and vital capacity:* The intimate interdependence of circulatory and respiratory systems is generallly recognized. In heart failure the lung suffers first from venous stasis, and the resistance of the pulmonary circulation is governed largely by the degree of lung expansion. The pulmonary circulation is disturbed much more in compression pneumothorax than in expansile pneumothorax. If the reserve power of the heart is unimpaired it compensates well, but if there has been long and persistent toxemia pulmonary stasis occurs. It was noted that some pneumothorax patients showed an increase in systemic blood pressure after treatment, and some a decrease. The former constantly showed enlarged cardiac dimensions and only slight reduction in vital capacity; in the latter the reverse was true. The degree of compensation demanded of the heart is obviously proportional to the amount of lung compression. In very anemic or toxic patients inflation should be very gradual and the amounts small. Spirometry is here of valuable aid. *Dyspnea, vital capacity and lung function:* The smaller the residual air the better the lung ventilation; hence in moderately collapsed lungs dyspnea is rarely seen. The effective ventilation volume of the alveoli is represented by the tida! air minus the dead space over the reserve air, or normally about one-seventh. In expansile pneumothrax the ratio is generally higher, while a greater volume of blood per unit of time passes through the reduced lung area. In completely compressed lungs, on the other hand, the compressed lung plays scarcely any part in ventilation. Such patients are apt to remain dyspneic for a long time unless compensation is unusually effective. In this respect individuals differ greatly. *Clinical and prognostic significance of periodic spirometry in pneumothorax therapy:* Spirometric readings, carefully taken and properly interpreted, afford valuable information to the clinician using pneumothorax. After the initial injection there is always a fall in the vital capacity more or less corresponding to the amount of air introduced. If the fall is more than 15 per cent, dyspnea and marked discomfort ensue. The initial amount of gas should, therefore, never exceed one-sixth of the patient's vital capacity, and the next few insufflations should be proportionately regulated. Should a sudden drop occur in the vital capacity a careful physical and roentgenoscopic examination is indicated, and a spontaneous pneumothorax or effusion should be suspected. During the early part of the treatment a step-like decline in vital capacity is usual, but is without distress to the patient, as adjustment to the modified ventilation takes place. A certain limit is reached after which the vital capacity either remains stationary or gradually ascends. This point ordinarily occurs between the first and fourth months. A stationary vital capacity signifies an arrested or quiescent lesion. Marked fluctuations mean an active lesion. Two phenomena occur simultaneously in lungs treated by pneumothorax:(1) contraction and shrinkage of the diseased portion, and (2) dilatation of the uninvolved portion. The idea of "knocking the entire lung out of commission" by pneumothorax should be abandoned and attempt be made merely to keep the diseased parts compressed and contracted. The amount of air introduced should not curtail more than half its own quantity in vital capacity. Introduction of large quantities of air always results in encroachment on functioning tissue. The expansile capacity of the undiseased parts of the lung should be carefully noted, and marked differences between preinsufflatory and postinsufflatory vital-capacity readings avoided. Fluid, when it occurs, should not be allowed to remain long, but should be aspirated and partly replaced by air. No untoward results have been noted from blowing the spirometer, although during the first few weeks of treatment the patients are restricted to as few efforts as possible.

Later on, this extra dilatation of the expansile parts of the lung seems to be beneficial. In two treated cases readings of 100 per cent of the calculated normal were eventually reached. It is emphasized that at Bedford Hills compression pneumothorax is now seldom used, the chief indication being severe hemoptysis, in which it is only temporary. When there is extensive fibrosis, of course no great reëxpansion of the lung can be expected, and the vital capacity remains at a low ebb. This furnishes an argument for the earlier use of pneumothorax, when both anatomical and functional recovery are still possible. *Conclusions:* 1. The vital-capacity modifications during pneumothorax treatment are characteristic and much information of value is obtainable by spirometry. 2. There is no constant relation between the amount of air introduced and the reduction of the vital capacity, as the different factors enumerated produce different results. 3. Pneumothorax patients with low vital capacities experience less dyspnea than other tuberculosis patients with the same vital capacity, as the ventilation volume of each alveolus is more effective in the former. 4. There are three distinct phases in the course of treatment: a gradual decrease, a stationary period, and a slowly progressive increase. A sudden and marked initial decrease is of unfavorable import, while a stationary vital capacity is preferable to one showing marked fluctuations. 5. Not more than one-sixth of the vital capacity should be introduced in beginning pneumothorax. 6. Those with an initial high capacity, especially young people, show much better respiratory recuperation than others. 7. Complete recuperation of respiratory capacity is seen only in cases treated with expansile pneumothorax. In compression pneumothorax the reduction is marked, and remains so if fibrosis and atelectasis preponderate. 8. Fluid should be aspirated early from the pleural cavity to avoid permanent impairment of respiratory capacity and partially replaced by air. The patient should practise blowing the spirometer several times daily if reëxpansion of the lung is desired. No untoward results have been noticed from this blowing.—*The Vital Capacity in Artificial Pneumothorax, R. A. Bendove, Arch. Int. Med., July 15, 1925, xxxvi, 94.*—(*A. P.*)

Pressures in Artificial Pneumothorax.—There has been much discussion in the literature on the subject of pressures and their measurement and significance. It must be recognized that the mechanism by which pneumothorax acts in the treatment of pulmonary tuberculosis is not yet settled. To-day complete immobilization of the lung is not absolutely indispensable. Again, manometric measurements in centimetres of water do not correspond directly with the state of pulmonary collapse or compression. Some practitioners attach most importance to the height of the oscillations, others to the so called "mean pressure," for which Leuret, *et al.*, use Marey's "compensating manometer." However, it is a question, not primarily of apparatus, but of principle. *Mechanics of the respiratory apparatus:* The thoracic cage moves about two fixed points, the vertebral column and the sternum, the motile force being supplied by the thoracic and diaphragmatic muscles. The lungs are endowed with an elasticity of constitution and of function; that is, they are both distensible and collapsible, according to the forces acting on them. The forces acting on the pulmonary tissue increase from apex to base and are barely perceptible in the hilar region; they are also more marked toward the periphery. The continuity of the elastic lung mass is interrupted by the lobar and interlobar incisures. Thus it may be seen that intrapleural pressures will vary in different localities, and that effective pressures in pneumothorax will likewise vary with the topography of the lesions. The diaphragm is subject to both active and passive movements; its tonus is relatively weak, and its functions are easily altered under the conditions in pneumothorax. In the pleural cavity under normal conditions there exists a pressure less than atmospheric, represented by the difference between 1033 cm. water and 1018 cm. water. This difference causes the aspirating force of the thoracic cavity at rest. The force and amplitude of excursion of the lung, the diaphragm and the thorax influence this pressure. *Modified conditions in artificial pneumothorax: 1. Full inspiratory pneumothorax, lung elastic, no adhesions, mediastinum fixed:* Here, up to a certain point, the presence of gas in the pleura has comparatively little effect on respiration and the manometric figures tend to remain negative. *2. Partial large pneumothorax, lung partially infiltrated, mediastinum fixed, respiratory function partially compromised:* The presence of adhesions tends to alter lung function and intrathoracic tension; inspiration is especially affected. Sometimes diaphragmatic function compensates for pleuropulmonary rigidity, but the increased inspiratory pressure is due more to rapidity of tension and increased tone of the diaphragm than to other factors. 3. Small expiratory pneumothorax, extensive pulmonary lesions, and marked impairment of function: Here the relation between pulmonary and thoracic

tension is profoundly altered, and despite marked manometric readings inspiration is almost nothing, expiration minimal. The gas then acts like a foreign body to limit respiratory movement. *Volume pressure and ventilation pressure:* The former is difficult to determine, while the latter varies with the amplitude and force of respiratory movements. In pulmonary tuberculosis the reserve air, the residual air and the complementary air are all reduced, especially the last, because the expansile forces are earliest affected. In general, the amplitude of manometric oscillations indicates volume pressure; the depth of the oscillations, ventilation pressure. In a free pneumothorax the two can scarcely be distinguished. The ventilation pressure diminishes with increasing compression of the lung, and when elasticity is lost we have only volume pressure. The introduction of gas acts differently according to the pathological conditions, and some have distinguished different types of pneumothorax, such as *pneumothorax de repos* and *pneumothorax de compression.* Each individual has an optimum pressure which, however, is subject to change, and the secret of good technique consists in finding and maintaining this. Manometric values furnish only a relative criterion and do not measure directly the degree of compression or compressibility of the lung. Leuret's exposition of the "effective intrapleural pressure" is faulty in assuming that the real effective pressure bears a constant relation to the inspiratory and expiratory pressures and in supposing the conditions of the respiratory system to be analogous to those of the circulation.—*Sur la valeur et la mesure des pressions dans les pneumothorax artificiels, Parodi, Rev. d. l. Tuberc., March, 1925, vi, 193.*—(*A. P.*)

Thoracic and Intrapleural Respiratory Tracings in Artificial Pneumothorax.—Since March, 1923, these studies were carried on, using the graphic method of recording, in 14 patients from the time of beginning treatment; in others, during the course of treatment. The first tracings were obtained with Marey's instrument, through a Kuss needle and a Y-shaped connecting system, the records being made on a smoked cylinder; later, Boulette's polygraph was employed, and Verdin's bilateral pneumograph. Thus, on the same paper were recorded the intrapleural tracing, the extrapleural tracings of both sides, and the pulse tracing. The tracings were studied in relation to different phases of insufflation, as follows: (1) immediately after puncture before introducing gas; (2) in the course of insufflation; and (3) at the end of insufflation. *Immediately after puncture* there was noted a marked temporary diminution of the respiratory movements, which slowly returned to normal. *In the course of insufflation* there was noted an increased frequency of respiratory movements, and a diminished amplitude, with a tendency to equalization of inspiratory and expiratory phases. *Toward the end of insufflation* the amplitude of the respiratory oscillations diminished more and more, but they did not disappear until a quite strongly positive pressure was reached, usually around +6 cm. of water. *The thoracic wall tracings* vary considerably in form and amplitude, but are generally diminished on the diseased side and increased on the other side. *Interpretation of facts observed:* The slight pain produced by the puncture is assumed to excite a pleural reflex, temporarily inhibiting respiration. Although the excursion of the insufflated side of the chest is much reduced, the intrapleural oscillations are quite marked. This is undoubtedly due to the elasticity of the lung itself, and still more to the elasticity of the mediastinum. When this is weak and flaccid the oscillations at once become flattened. Thus, when the tracing tends to come to a standstill, insufflation should be stopped in order to avoid dislocation. Ordinarily, this occurs somewhere near the zero point, or atmospheric pressure.—*Tracés respiratoires thoraciques et intrapleuraux au cours du pneumothorax thérapeutique, D. Olner and A. Raybaud, Section d'Études scientifiques de l'Oeuvre de la Tuberculose, November 8, 1924, reported in Rev. d. l. Tuberc., January, 1925, vi, 111.*—(*A. P.*)

Determination of Pleural Pressures in Artificial Pneumothorax.—Kuss answers in detail various criticisms and objections which have been made concerning the apparatus and method employed by him, which consists essentially of a manometer of large calibre, of which the gas flasks themselves form a part, or at least the one proximal to the needle. In order to read the pleural pressure an equilibrium must be established at the beginning of inspiration between pleura and manometer; that is, the movable flask must be so adjusted that the fluid levels in the flasks remain stationary. A rather complicated mathematical formula is given, which represents the relations existing between amplitude of oscillations, interior diameter of manometer, volume of pneumothorax, and respiratory interchange. It is shown that for manometers having an interior diameter of 5 to 6 mm. the respiratory oscillations are considerable (22 to 24 cm.), but when the manometer tube has an interior diameter of 6 cm. the oscillation is

only about 1 cm. Tubes of larger diameter cause very little further deadening of the oscillations, the relations being shown by a parabolic curve which flattens out toward the end. This manometer of 6-cm. diameter shows what may be termed the mean pleural pressure, the resultant of the variable respiratory forces. This method requires that one of the flasks should be elongated, fixed, and of small capacity (500 to 600 cc.). The other flask, used to change the pressure, is mobile, and preferably moved by a small windlass, easily turned by one hand. *Refutation of criticisms:* 1. It is stated that the reading obtained is a false one, as air must first pass from the reservoir into the pleura. With sufficient dexterity, however, the flasks can be so rapidly adjusted that this cause of error is negligible; not over 10 to 25 cc. of gas should have passed over, even when adjustment is not immediate, and this is of little importance if one has the flasks arranged so that the gas is aspirated and not forced in under pressure. There is the added advantage that one is immediately warned of an obstacle by the gas ceasing to flow, and that it is not necessary to be constantly interrupting the insufflation in order to take a reading. 2. Leuret objects that the initial pressure existing in the pleural space cannot be determined by this method. This objection is similar to the first. In fact, whatever instrument be employed, some gas must be aspirated before oscillations can be obtained in the manometer. A strong initial aspiration does not always indicate a free pleura. 3. Leuret objects to the slowness in obtaining readings. This is remedied by the acquisition of dexterity, although too rapid work is undesirable. 4. The size of the needle is criticized. However, too fine a needle retards and interferes with the readings because of mechanical obstruction, and renders equilibration very difficult. Kuss has used for fourteen years nickel needles with a stilette. The hardness of the nickel permits of very thin walls, but the interior diameter is 1 mm. A somewhat smaller needle (no. 2) is occasionally used, having a bore of 0.7 mm. With the no. 1 needle 3 cc. of gas under 2 cm. pressure can pass in one second. Bertier, on the other hand, uses a fine platinum needle without a stilette the bore of which is only 0.55 mm. Such a needle is generally more painful than the larger nickel one, which is better shaped and clogs more easily. If the lung should be punctured the insufflation, according to Kuss's method, will automatically cease. *Importance of exact pressure readings:* Recently Bertier and others have intimated that the pleural pressure is a variable, changing constantly, and that the mean pressure figures are largely of academic interest; that it is the maximum pressure which is of chief importance from the point of view of mechanical accident. Kuss points out that we have no means of measuring the maximum pressure which may develop, as it depends on unforeseeable circumstances, and that all that can be done to this is to warn patients against extreme efforts. However, the only dangers are not those consequent on sudden ruptures or efforts. When at rest the pleural pressure may be much too high, and exert a baneful effect on neighboring viscera; also, this pressure may, if long continued, predispose to tears and ruptures. Taken alone, the figure of the mean pressure signifies little; for a given patient it has a very definite meaning as reflected in its effects on the clinical symptoms. In some patients one can appreciate clinically a difference of 0.5 to 1 cm. If it is realized that we are speaking of resting pressure in the horizontal position, there is no room for ambiguity in pressure readings. It is important to find in each case, at each stage of treatment, the optimum pressure, and then to keep as near that as possible. Without an accurate index of this, we are working in the dark. *Indications for oscillating manometers and means of damping oscillations:* These come into use when a fine needle is used, or a filter, or when the pleural pressure is quite high. The principle of damping is that applied in Marey's compensating manometer, first applied to pneumothorax work by Wurtzen and Petersen of Norway, and used for ten years by Kuss. Wurtzen and Petersen merely applied a clamp to a rubber tube interposed in the glass manometer tubing. A better system is that of Parry Morgan (of London) who interposes a small cylindrical piece of metal between the tubing coming from the pleura and the closed manometer limb. Kuss himself prefers a stopcock with a perforation fitted into the open limb of the manometer. It is easily managed and two manometers become unnecessary. The castor-oil manometer recommended by Bertier is much more awkward and does not give true readings because of its viscosity. An error of 0.5 to 1 cm. may correspond to 150 to 200 cc. of gas.—*Détermination de la pression pleurale dans les pneumothorax, M. G. Kuss, Section d'Études scientifiques de l'Oeuvre de la Tuberculose, November 8, 1924, reported in Rev. d. l. Tuberc., January, 1925, vi, 78.*—(*A. P.*)

Simple Method of Obtaining Skiagrams in Artificial Pneumothorax.—The apparatus required, in addition to the ordinary fittings to an X-ray outfit, is

extremely simple. It consists of a clean, smooth gelatine film, the photographic film from an old 15 x 12 inch negative, a roll of adhesive plaster, soft black and red grease pencils, black and red pastels, xylol, and sheets of typing paper the size of the gelatin film. To make records of the patient's chest a good screen is obtained with about 1 to 3 *ma.* The gelatine film is fixed over the centre of the fluorescent screen by three strips of adhesive plaster. The patient is placed in the usual position, and the fluorescent screen pressed firmly but gently on the chest. The distance of the screen from the tube is noted, and marked with the grease pencil on a corner of the gelatine film. The screen is then fixed and the current switched on. The outline of the thorax with the clavicles, the diaphragm and the heart, are quickly sketched on to the gelatine film with the grease pencil. Then any definite lines made by the shadow of the collapsed lung, fluid, or calcareous masses are marked. The lower edge of the film is then released and gently raised, and the finer variations of the shadows on the fluorescent screen are observed. The film is then replaced, and as many as are thought necessary of these shadows are recorded. The current is now switched off and the film removed. In practice it is found that the gelatine film tracing can be made in one minute. The film is then taken and placed in a viewing box, with a sheet of paper of the same size over it. The markings of the grease pencil are then traced on the paper with pastel and shaded with a shading stump, the result being a pastel tracing of the important shadows seen on the fluorescent screen. The paper is then removed from the viewing box, pinned on to a board, and the pastel fixed by pouring boiling milk evenly over it; it should then be hung up and allowed to dry thoroughly. This prevents smearing and makes the drawing permanent. The films are carefully cleaned with xylol on cotton-wool swabs, and are ready for use again. When information of the condition of the patient's chest is again required, the skiagram is placed in the view-box, with a clean gelatine film over it. The main outlines are marked on the film with a red grease pencil, paying particular attention to the position of the edge of the lung, or the fluid level, or any other feature that is of interest. The patient is placed in position for screening, and the film with the red tracing is fixed to the fluorescent screen, care being taken that the latter is the same distance from the tube as on the previous occasion. All variations of the positions of organs are now marked with black grease pencils, and the process of obtaining a tracing is repeated, either on the original skiagram, using red pastel, or on a new piece of typing paper. By this method a permanent series of pictures of the patient's chest is obtained, showing very clearly and with considerable accuracy the changes which have occurred in any particular condition under observation.—*A Simple Method of Obtaining Skiagrams in Artificial Pneumothorax Work, F. R. G. Heaf, Brit. J. Tuberc., April, 1925, xix, 80.—(B. T. McM.)*

Flouoroscopy in Artificial Pneumothorax.—The pneumothorax treatment of pulmonary tuberculosis necessitates frequent radioscopic examinations to determine the form and degree of collapse, situation of the gas and effect on the lesions; also the development of pleural adhesions or effusion. The gas may collect in unusual locations; for instance, near the mediastinum or in the interlobar fissures. Fluid gives always a flat level, often with undulations due to the heart beat. Very small effusions merely fill the costophrenic sinus. The hilar shadows of the sound side are generally increased, due to increased vascularization. Hilar propagation of the disease may be noted under the fluoroscope. Mediastinal displacements are readily observed, and usually a slight widening of the interspaces and lowering of the corresponding half of the diaphragm. Brauer has described mediastinal hernias, especially anteriorly at the level of the third rib at the site of the atrophied thymus gland. In old pneumothorax cases the intercostal spaces are narrowed, contractile forces predominating. To visualize a small pneumothorax, the oblique position is usually best. The mediastinum shows elastic movement, toward the collapsed side on inspiration, the other way on expiration. Occasionally pleural effusions lead to modifications of diaphragmatic movement, as shown by Kienbock's phenomenon, where one-half of the diaphragm is elevated as the other is lowered. This seems best explained by Wellmann on the basis of diminished pressure on the pneumothorax side by chest expansion, the affected half of the diaphragm acting more or less passively. No explanation is altogether satisfactory, however.—*De la radioscopie du pneumothorax artificiel, F. Mayeur, Rev. Belge d. l. Tuberc., March, 1925, no. 3, 73.—(A. P.)*

Tuberculosis Antibodies and Skin Reaction during Artificial Pneumothorax.—A number of investigators have performed the complement-fixation and the skin tests at the same time in tuberculosis of different types. They agree almost with-

out exception that there is no relationship in intensity or otherwise between the presence of serum antibodies and the skin reaction in a given case at the same time. But these tests have not been made together and in series, in order to determine any changes of intensity. This the author has done in 13 cases of artificial pneumothorax treated in the Laennec Hospital at Paris, during a period of seven months. He performed both tests, the complement-fixation with increasing amounts of complement, at intervals of fifteen days to three weeks, for five to seven months following the institution of pneumothorax. Two antigens were used: the methylic antigen of Boquet and Nègre and the egg antigen of Besredka. The skin reactions were performed with raw tuberculin, different parts of the arm being always employed in order to avoid local sensitization. The Wassermann reaction was negative in all cases. The 13 cases fell into three distinct groups: (1) Five patients with satisfactory pneumothorax, disappearance or improvement in symptoms, and no complications in the course of the treatment; (2) six patients who developed pleural effusion with fever; and (3) two patients with subsequent extension of the process to the opposite side. As to results: in group 1 the antibodies diminished progressively or disappeared in the course of treatment, a definite fall in the antibody content coinciding with amelioration of the patient and a good collapse of the lung. The skin reaction in this group, on the contrary, steadily increased for several weeks. In the second group, complicated by pleural effusion in the course of treatment, there was found an important increase in antibodies at the moment when the effusion was produced. This figure fell again or even became nil when the fluid disappeared. It remained high while the fluid persisted. Meanwhile, the skin reaction increased in intensity with clinical improvement and did not seem to be influenced by the appearance of effusion. The author believes that the increase in antibodies in the presence of effusion is due to the absorption by a large serous surface of bacillary toxins and products; also the amount of antibody in different forms of tuberculosis depends directly and solely upon the absorption of products and toxins of the tubercle bacillus. This view explains much that has been difficult to explain in the results of complement fixation in tuberculosis. This reaction seems to be purely humoral, in no way fixed, and to disappear as soon as its cause is removed. It bears no relationship to the allergy revealed by the skin reaction. The latter reaction expresses resistance. In the third group, in which there was spread to the opposite lung, there was an increase in the amount of antibody when the extension became evident clinically. A little later the skin reaction began to subside.—*Anticorps tuberculeux et cutiréaction au cours du pneumothorax artificiel, J. E. Wolf, Ann. de Méd. Par., April, 1925, xvii, no. 4, 380.—(W. B. S.)*

Pleurisy in Artificial Pneumothorax.—Pleurisy is the most important complication of artificial pneumothorax. The effusions are mostly exudates and will occur, in slighter or graver form, in a large percentage of all patients receiving the treatment. The dry pleurisies tend to occur repeatedly before the more serious effusions appear. Shoulder pain is an important symptom. There is but small evidence that "secondary" infection is responsible for the pleurisy, and this is true for pleurisies either with or without pneumothorax. Although the clear serous exudates often leave adhesions, the prognosis is good with respect to them. These fluids should always be withdrawn. Purulent exudates come chiefly from the rupture of a focus of tuberculosis or cavity into the pleura. A rapid rise of intrathoracic pressure after the introduction of a small amount of air is a characteristic sign of a small empyema, which may be purely tuberculous or may be a mixed infection. Mixed infections, probably from refilling, often occur as empyemata, and the course is stormy. But tubercle bacilli can nearly always be found in the purulent fluid. The treatment of exudates of mixed infection is difficult and the disease serious. Frequent irrigations and discontinuance or lessening of the artificial pneumothorax are indicated. Healing requires months. Operations which lessen the size of the large infected surface are helpful. The formation of adhesions prevents satisfactory pneumothorax, but, if it is sufficiently developed, the obliteration of the cavity, scarring of lung and retraction of the thoracic wall may act as thoracoplasty does. The acute empyemata are very serious. Repeated drainage, irrigation and maintenance of high gas-pressure are very helpful as a rule. In severe tuberculosis with cavity and with pleural exudates it is a question as to whether to treat conservatively (and allow the patient slowly to become steadily worse) or radically, by doing thoracoplasty and thus take a long chance. Pneumothorax is best indicated in cases with spreading tuberculosis that has not reached the pleura or has not developed cavity, for in such cases pleural complications are much less common, and the other side is usually not so badly diseased as in the more advanced conditions. The indi-

cations for and against pneumothorax in each individual case are of the greatest importance. The technique employed is also very important.—*Über die Pleuritiden beim künstlichen Pneumothorax, P. Deuel, Klin. Wchnschr., December 2, 1924, iii, 2251.*—(*H. S. W.*)

Pleurisy in Artificial Pneumothorax.—Recently Bernard and Baron have published a comprehensive article on this complication, which they observed in 60 per cent of pneumothorax cases. They described four types of pleurisy: (1) serous or fluid, (2) adhesive, (3) mixed, and (4) grave or septic, this last variety being quite uncommon. Pissavy adds to this the following conclusions from his own observation: *Serous or liquid pleurisies* In this form there is little tendency to adhesions and, except in the case of very massive and dangerous collections of fluid, the rule of nonintervention is recommended. Thoracentesis may lead to such inconvenient and annoying features as infection of the chest wall, with painful swellings. If the effusions are purulent, a permanent fistula may ensue. *Adhesive pleurisies* Bernard and Baron here advocate puncture for the sake of introducing gas to maintain the pneumothorax. However, they present little evidence that this is effective and it is possible that the repeated traumatisms may even favor formation of adhesions. Hence, a policy of abstention is again recommended, as also in the mixed forms. *Grave pleurisies* These occurred in 2.7 per cent of 254 cases observed. They may follow pulmonary perforation, and secondary infection is common, especially with streptococci and pneumococci. Careful observations have conclusively shown the endogenous origin of these infections. It is from the lung that the pneumococci, streptococci or anaerobes are derived. Every case of septic pleurisy followed by Pissavy has resulted fatally, no matter how treated.—*Les pleurésies du pneumothorax artificiel, A. Pissavy, Presse Méd., March, 1925, no. 25, 402.*—(*A. P.*)

Treatment of Effusions in Artificial pneumothorax.—Effusions are simple, serous and purulent. The first type is very common, occurring in 50 per cent of pneumothorax cases, and generally causing no symptoms. The serous type is also fairly common, being initiated with pain in the side and fever, gradually rising, with gradual accumulation of fluid. The fever generally lasts three or four weeks, and the effusion is either absorbed or, if persistent, may necessitate aspiration and replacement by air. This replacement prevents expansion of the lung and adhesion to the chest wall. Purulent effusions may be due to tubercle bacilli alone, which is most common, or to mixed infection with tubercle bacilli and pyogenic bacteria. The first type most often develops gradually from the serous type. Aspiration and replacement with air are indicated after the acute symptoms subside, preferably in small amounts at a time. The same procedure may be tried in the mixed infections or, instead of air, 10 per cent oil of gomenol may be introduced. The septic process often subsides under these measures. Irrigation of the pleura is condemned as irritating and of no value. The more severe cases may come to a plastic operation and are often fatal. The two chief principles followed are to refrain from unnecessary intervention during the acute stages of these effusions and, when aspiration is necessary, to establish or maintain a pneumothorax if there is any suspicion of underlying lung involvement.—*Treatment of Effusions in Artificial Pneumothorax, B. Hudson, Brit. M. J., June 20, 1925, no. 3364, 1125.*—(*A. P.*)

Prevention of Effusions in Artificial Pneumothorax.—To prevent the occurrence of exudates in artificial pneumothorax lung tears must be avoided, and inflammation minimized, as far as possible, influenced by the administration of calcium. Since this method of treatment was followed, all the patients, with one exception, have remained exudate-free. Thirty-five cases observed over a period of at least 60 days and extending to three years are reported.—*Ist das Pneumothorax exsudat vermeidbar? Warnecke, Beitr. z. Klin. d. Tuberk., 1924, lix, 96.*—(*H. J. C.*)

Some Rare Accidents of Artificial Pneumothorax—*Case 1:* A young woman, with acute phthisis of the left upper lobe, was treated by pneumothorax, and an excellent collapse obtained. A half-hour after her fourteenth insufflation, on attempting to sit up in bed to eat, she experienced violent abdominal pain and suffocation. When seen, two hours after the refill, she was intensely dyspneic, the left chest moved with respiration and gave no signs of pneumothorax, but large moist râles were heard. The temperature went up to 39.5°C. The abdomen was somewhat tympanitic. All these symptoms subsided in a few days. The patient would not have further treatment, and the only plausible explanation seemed to be a diaphragmatic hernia through a congenitally weak place, with collection of the gas under the peritoneum, the lung meanwhile expanding. *Case 2:* A young

girl was given pneumothorax for extensive left-sided ulcerocaseous lesions with hemoptysis. Two years later signs of trouble appeared in the other lung, and treatment of this side was contemplated. Meanwhile a pleurisy, followed by pachypleuritis developed on the pneumothorax side. Nevertheless, the patient insisted on the second pneumothorax and this was reluctantly undertaken, after first withdrawing gas from the left chest to a pressure of −18. No entrance into the right pleura was obtained, pulmonary oscillations being registered, and the needle was withdrawn. After a few moments the patient complained of suffocation and showed signs of a right pneumothorax. Aspiration of air was performed and a cannula left in the chest, as the pressure reaccumulated. After nineteen hours respiration again became normal. This was a spontaneous pneumothorax developing after puncture of the lung, but rapidly healed. Roentgenograms confirmed the diagnosis. *Case 3:* A man of 35, with large ulcerated lesions of the left lung, was sent for pneumothorax. Roentgenograms showed almost complete opacity of this side. Puncture was made in the fourth interspace in the axillary line. A negative reading was obtained, and 250 cc. of gas introduced. Shortly afterward, a sense of drawing in the right side was complained of; then he was seized with intense dyspnea, with sense of suffocation, and cyanosis. The left chest was punctured again, and a larger quantitiy of gas withdrawn. Chest examination showed signs of a right pneumothorax, while the left lung breathed fairly well. Fluoroscopy showed the double pneumothorax more extensive on the right. Withdrawal of 1000 cc. from the right chest relieved the dyspnea. This had to be repeated the next day, and then a cannula was left in till the fifth day, when the pneumothorax was nearly gone and there was slight effusion. Here, also, there must have been a secondary lung rupture, but the air evidently made its way to the opposite pleura, which was freer, through a physiological communication.—*Sur quelques accidents rares du pneumothorax artificiel: deux cas de pneumothorax thérapeutique bilatéral asphyxique, un cas d'inondation gazeuse peritonéale, Dumarest and Bonafé, Section d'Études scientifiques de l'Oeuvre de la Tuberculose, November 8, 1924, reported in Rev. d. l. Tuberc., January, 1925, vi, 104.*—(*A. P.*)

Fibrosing Pleurisy in Artificial Pneumothorax.—Attention is called to certain pleurisies which occur during artificial-pneumothorax treatment and which are followed by complete pulmonary sclerosis, thus assuring definite cure of the patient in spite of the forced discontinuance of pneumothorax treatment by reason of pleural adhesions. Three observations were made on cases in which sclerosis with adhesion of the lung and pleura and subsequent cure followed pneumothorax treatment of cases in which a fistula had formed. It is possible at present to characterize these pleurisies by their effects, and in spite of several attempts there was no success in reproducing them. Rist reports that some patients whose fever and bacilliferous expectoration continue in spite of pneumothorax are much benefited by the production of an effusion.—*Les pleuresies sclérogènes du pneumothorax artificiel, J. B. Morelli, Meeting, Soc. Médicale des Hôpitaux de Paris, April 9, 1925, reported in Presse Méd., April 8, 1925, no. 28, 454.*—(*E. H. K.*)

Sudden Death Following Pleural Puncture in Artificial Pneumothorax.—Léon-Kindberg reports a case of sudden death following artificial-pneumothorax treatment in a patient with a free pleura. Autopsy showed no local lesion, no lesion of the viscera or of the nervous system, particularly no embolus. It is necessary to fall back on the pleural reflex theory to explain the hemiplegic and epileptiform seizures which were observed.—*Mort subite consécutive à une punction pleurale, Léon-Kindberg, Meeting, Soc. Méd. des Hôpitaux, January 30, 1925, reported in Presse Méd., February 4, 1925, no. 10, 151.*—(*E. H. K.*)

Fatal Air Embolism in Artificial Pneumothorax.—A case is reported in which vomiting appeared one minute after introduction of a needle into the pleura for the injection of novocaine-adrenalin prior to the institution of artificial pneumothorax. The pulse, respiration and general appearance were normal. Hearing was diminished and there was a contraction of the right side of the face. During the night there occurred restlessness which was quieted by morphine and in the morning the patient died. At postmortem no air was found in the brain which, however, showed petechial hemorrhages. The cerebral findings and death are attributed to air embolism of the brain and not to pleural shock.—*Ein Fall von Luftembolie bei Pleurapunktion, Hochstetter, Ztschr. f. Tuberk., 1924, xl, 110.*—(*H. J. C.*)

Artificial Pneumothorax and "Ventralization" in Pregnancy Complicated by Pulmonary Tuberculosis.—Among 10 pregnant women there was one abortion, 3 premature births, and 6 deliveries at term.

In 8 of these the condition of the mother became worse with rapid death in 3; in one case there was no change; and in the last, who was being treated by artificial pneumothorax, there was definite improvement. This patient was in poor condition at the beginning of her pregnancy, but following treatment gained 9 kgm. in weight and was much improved. She was delivered at term of an infant weighing 2,810 gm. and there was no relapse. In reviewing 3 cases of rapid death following delivery various explanations are considered, such as tearing loose of placental tubercles, decalcification of the body, exhaustion from the exertion of labor, and, finally, ventralization. By this term is meant the tampon action of the diaphragm on the pulmonary lesions during pregnancy, while after the delivery of the fetus this compression suddenly disappears, with consequent aggravating action on the pulmonary condition.—*Pneumothorax artificiel et ventralization dans la grossesse complique de tuberculose pulmonaire, Andebert and Baylac, Meeting, Soc. de Méd. de Chirurgie et de Pharmacie de Toulouse, March 11 & 25, 1925, reported in Presse Méd., April 18, 1925, no. 31, 505.*—(*E. H. K.*)

Specific Chemotherapy in Tuberculosis.—Drugs are employed in tuberculosis either with the object of attacking and preventing the growth of the tubercle bacillus or other microörganisms with which the disease may be associated, or of neutralizing poisonous toxins, or of removing or relieving symptoms. Th first group is discussed. *Coal tar derivatives:* If any of these, such as cinnamic acid, creosote or guaiacol, exert a beneficial action on tuberculous patients, the explanation is not that they influence directly the tubercle bacillus. The same is true of formic aldehyde which in the body combines with proteins and loses all antiseptic action. *Essential oils*, such as oil of cinnamon and oil of garlic, have no specific effect. *Calcium* injections may influence favorably the condition by limiting inflammatory exudation, but they do not influence the cause of the condition. *Silica* is said to have beneficial effects, but Maver and Wells conclude that these are not established. *Arsenic and mercury:* DeWitt observed fibrosis and healing of tuberculous lesions in animals treated with mercury compounds. Arsenic inhalations were used with benefit by Chavant. Organic arsenic derivatives, such as arsphenamine and its silver compounds, have no effect on the disease. *Quinine and acridine derivatives*, which exert a specific action against certain bacteria, have no effect on the tuberculous process in living animals. *Cerium:* Frouin reported that fibrous tissue developed about tuberculous lesion in rabbits and guinea pigs treated by injections of cerium sulphate. Grenet and Drouin found that cerium earths reduce the fats of the tubercle bacillus in cultures and that they produced a mononuclear leucocytosis in tuberculous patients, who improved in every way following injections. The treatment is considered of value in afebrile cases. Any action of the cerium salts must be indirect, as they have little more direct action in killing the tubercle bacillus than potash salts (1 to 5 parts in 1000 to prevent growth). Clinical tests have not been properly controlled. *Copper:* Luton, in 1894, in a monograph first drew attention to copper as a specific in tuberculosis. Grafin v. Linden and her colleagues in Germany produced a complex copper lecithin compound of secret composition; and soon afterward Koga, in Japan, produced cyanocuprol as a cure. Neither of these were proved to be effective. Copper salts are very active against the tubercle bacillus *in vitro*, but they are not specific clinically. *Gold:* Koch showed that $KAuCu_2$ (1 in 1,000,000) prevented the growth of tubercle bacilli in cultures, but the presence of blood serum interfered with the action and reduced the efficiency to 1 in 25,000. Gold chloride inhibits when in a dilution of 1 in 2,000,000, but exerts no favorable influence on tuberculosis in animals. In general gold salts have proved no better than copper. Aurocantan (cantharadin-ethylene-diamino-aurocyanide) was found too toxic for use. Feldt next introduced krysolgan which prevents the growth of the tubercle bacillus in cultures in 1 part to a million. Animal experiments with this substance are not very promising, though Feldt's clinical results are hopeful. Sanocrysin is discussed, and several faults in Moellgaard's experimental procedure are pointed out. The experiments are regarded as suggestive but not conclusive, which may also be said of some of the krysolgan and copper experiments. Clinical records of treated patients must be kept for years before the true value of a remedy for tuberculosis can be gauged.—*The Specific Action of Drugs in Tuberculosis, W. E. Dixon, Brit. M. J., May 2, 1925, no. 3357. 813.*—(*J. B. A.*)

Chemotherapeutic Experiments in Tuberculosis of Guinea Pigs.—Tuberculous guinea pigs infected with human strains were treated with "Elektrocuprol" (Heyden), "Elektrokollargol" and "Elektroferrol Heyden" by subcutaneous injection. Treatment was begun two weeks after infection. Electrocuprol on account of its marked necrotizing action was given

in small doses containing 0.5 mgm. copper at weekly intervals. The animals rapidly became emaciated, and in many cases died from intercurrent diseases without showing any appreciable effect of the treatment, while the silver and iron preparations definitely increased the duration of life of the infected and treated animals. Experiments with "lecutyl" ointment given by inunction were entirely negative. Chaulmoogra oil and the propyl esters of chaulmoogric acid were without influence on tuberculous guinea pigs.—*Chemotherapeutische Versuche bei der experimentellen Meerschweinchentuberkulose, F. Klopstock, Ztschr. f. Tuberk., 1924, xli, 119.*—(*H. J. C.*)

Treatment of Tuberculosis with Drugs.—Much scepticism as to specific therapeutic measures in tuberculosis arises because of the varied nature of the disease, which causes many enthusiasts to bring forth crops of new remedies. Some of these remedies are good for one thing or another; for example, creosote and guaiacol in tuberculosis of the intestinal tract. Calcium and silica are drugs of theoretical but not practical value. The intravenous application of gold salts, especially krysolgan, has been extensively used. Local application of this drug to tuberculosis of the skin, throat, etc., sometimes helps initiate a healing process. Camphor acts as a cardiac stimulant and an expectorant. It retards the growth of tubercle bacilli *in vitro* when suspended in the culture tube. This, in addition to the fact that the drug is volatile and is eliminated through the lungs, should give camphor a place in the medicinal therapy of tuberculosis.—*Die medikamentöse Behandlung der Lungentuberkulose, M. Weiss, Wien. klin. Wchnschr., February 12, 1925, xxxviii, 204.*—(*H. S. W.*)

Treatment of Experimental Pulmonary Hemorrhage with Drugs.—Artificial wounds of lungs of rabbits were produced and the influence of a number of drugs upon the hemorrhage occurring was studied. The intravenous injection of adrenalin increased the hemorrhage but its intrapulmonary injection did not. Ergot had no marked action. Ethylendiamin decreased the severity of the bleeding; hypotonic and isotonic saline solution had no influence, but hypertonic solutions (10 per cent) inhibited hemorrhage; 10 per cent calcium-chloride solution and gelatine also inhibited it. Ordinary doses of digitalis and camphor had no influence but large doses augmented the hemorrhage.—*On the Influence of Some Drugs against Artificial Pulmonary Hemorrhages and a Contribution to the Experimental Antihemorrhagic Treatment of Hemoptoe, J. Yasui, Tokyo Igakkwai Zasshi, 1924, xxxviii, no. 12, Abstract from Japan Medical World, 1925, v, 70.*—(*M. M.*)

Treatment of Tuberculosis with Sanocrysin.—A clinical trial of sanocrysin has recently been undertaken in England under the auspices of the Medical Research Council, and a preliminary report on the early results is now offered. So far, these have been sufficiently encouraging to warrant further clinical study. Clinical experience has confirmed the description in Moellgaard's book of the immediate effects of sanocrysin as seen in Danish hospitals. The drug does appear clinically to have a specific action on tissues infected by tubercle bacilli, and the severity of the constitutional reactions does appear to be directly related to the intensity of the tuberculous infection. Further, the drug seems to have but slight toxicity for human patients who are not affected by tuberculosis, though in this respect very few control observations have been made. In all, about 30 cases are reported upon, of which 22 definitely had tuberculosis of the lungs. The latter are reported in some detail. Although the early cases of open pulmonary tuberculosis did show some evident improvement the results were not dramatic and, on the other hand, cases with more advanced disease did not stand the treatment well, and the condition of some of these was made worse.—*The Gold Treatment of Tuberculosis, A Preliminary Report by the Medical Research Council, Brit. M. J., April 18, 1925, no. 3355, 735.*—(*J. S. W.*)

Treatment of Pulmonary Tuberculosis with Sanocrysin.—The greatest risk in the treatment of phthisis by sanocrysin is the occurrence of the acute stage of collapse described by Moellgaard as shock. This condition is combated in a very striking manner by the intravenous injection of antitoxic serum. Signs of shock are most likely to occur when an injection of sanocrysin is given while the patient still shows a febrile reaction from a previous injection. As a rule, a long febrile reaction, lasting from one to two weeks, when the temperature rises and falls steadily, ensues after one or two sanocrysin injections. This reaction must be allowed to pass away before a fresh injection is given, and one must watch when it begins. In febrile cases, to prevent shock, one must wait until the fever has subsided, or begin with smaller doses of sanocrysin. Fatal hyperpyrexia may arise from giving the initial injections too rapidly following upon one another. The same

condition may also reinforce the third variety of intoxication which, in the form of anorexia, nausea, vomiting and kidney disease, nearly always appears during the treatment. The renal lesion manifests itself by the appearance of albumen and casts in the urine. Febrile reactions to the treatment diminish with each injection, and usually disappear after the seventh or eighth injection. Patients are subject to very uppleasant subsidiary effects in various ways during the treatment. Even in the absence of these the patient s general condition is often rather badly affected, as shown by loss in weight which may be as much as 5 to 10 kgm. *Results of treatment:* The treatment is most effective in recent, not too extensive processes, particularly of the exudative, pneumonic character. In favorable cases râles disappear or become scanty and dryish. The number of bacilli in the sputum diminish or disappear. The changes seen in serial X-ray pictures are the same as occur in chronic phthisis which, with appropriate treatment, becomes quiescent and is continuously transformed into typical fibroid phthisis. But with sanocrysin treatment all these changes take place rapidly in a few months in favorable cases, while with previous treatment it took years to obtain a similar result. *Conclusions:* 1. Sanocrysin has a specific curative action on tuberculosis of the lungs. 2. It does not seem to have the same effect on extrathoracic localized tuberculosis (surgical tuberculosis, meningitis, etc.) 3. It is very effective on fresh tuberculosis that has been manifest less than one year. 4. In older cases the effect of the treatment is uncertain. 5. It is difficult to use it in febrile cases, but some good results may be obtained in old cases of apyretic fibrous phthisis. So far it has not been able to cure acute lobar tuberculous pneumonia. 6. In ordinary cases a treatment lasts three to four months. 7. Generally the dangers may be avoided when the treatment is carried out in the right manner and with caution. 8. The antitoxic serum has a curative effect on acute shock. Its effect in preventing albuminuria is not clear, and further investigations are necessary.—*Treatment of Phthisis with Sanocrysin, K. Faber, Lancet, July 11, 1925, ccix, 62.—(B. T. McM.)*

Treatment of Tuberculosis with Certain Drugs.—A comparative study of the therapeutic value of drugs intravenously in ambulatory cases of chronic ulcerative tuberculosis of the lungs was made on four groups of ten patients each, treated with tuberculin, with sodium cacodylate, with sodium and iron cacodylates, and with sodium and iron cacodylates and nuclein, respectively. The first group showed an average gain of two pounds, the second of 5.7, the third 7.4 and the fourth 13.1 pounds. It is concluded that such a study is of practical value, that arsenic, iron and nuclein intravenously were beneficial in these cases, and that in chronic ulcerative tuberculosis of the lungs these remedies produce a greater degree of increased resistance and immunity.—*Comparative Studies in the Treatment of Chronic Ulcerative Tuberculosis of the Lungs, W. F. Dutton, Med. J. & Rec., October 21, 1925, cxxii, 457.—(E. H. K.)*

Treatment of Tuberculosis with Sanocrysin.—The experimental work of Moellgaard with sanocrysin is reviewed. An idea of the results of its use clinically may be obtained from the statistics of Würtzen. Of 64 cases, there were 17 improved, 12 worse, and 22 unchanged following sanocrysin treatment. There is no apparent influence on surgical tuberculosis. Severe reactions are frequent. Further experimental work is necessary in this promising field.—*À propos de la sanocrysine, Rist, Meeting, Section d'Études Scientifiques de l'Oeuvre de la Tuberculose, February 14, 1925, reported in Presse Méd., March 18, 1925, no. 22, 359.—(E. H. K.)*

Treatment of Pulmonary Tuberculosis with Krysolgan.—Fifty cases of pulmonary tuberculosis, the majority third stage and associated with laryngeal tuberculosis, were treated with krysolgan, and some of them with combined tuberculin therapy. In the majority of cases symptoms were improved and in a number of them a beneficial influence upon the disease process was noted. From 0.025 to 0.1 gm. was well tolerated. Focal reactions in the larynx were associated with a feeling of swelling and irritation, while in the lungs there occurred a temporary increase of sputum which rapidly disappeared and was associated at times with chest symptoms. A number of cases did not react to krysolgan at all. As a rule there occurred an increase in weight, and definite improvement of the pulmonary process and a disappearance of tubercle bacilli except in the more severe cases. The cases refractory to krysolgan, which were predominantly of a fibroid nature, were treated with tuberculin, and there resulted a hyperemia, which permitted a better entrance of the gold preparation into the focus. Krysolgan had a weakening influence upon the tuberculin reaction, so that larger tuberculin doses could be given in the combined treatment. The tuberculin was given on the day prior to krysolgan

injections, or periods of tuberculin treatment were alternated with krysolgan treatment. In agreement with Schroeder and Feldt, very small doses of krysolgan and tuberculin proved capable of preventing elevations of temperature. Besides loss of appetite a number of cases had albuminuria which disappeared on further injections. In some cases urticaria-like eruptions occurred, while in one case a generalized exanthema, which terminated like a lichen ruber developed. A number of cases exhibited intestinal symptoms, and one case resulted fatally from intestinal tuberculosis. If intestinal tuberculosis is suspected krysolgan is contraindicated.—*Krysolganbehandlung der Lunggentuberkulose. (Kombinierte Krysolgantuberkulinbehandlung. Weitere Fälle von Krysolganschädigung), W. Düll, Ztschr. f. Tuberk., 1924, xli, 122.*—(*H. J. C.*)

Treatment of Experimental Tuberculosis with Krysolgan.—Krysolgan injections did not influence the disease in guinea pigs or rabbits. Tubercle bacilli *in vitro* were not killed by 1 per cent krysolgan solution after 4 hours' contact. No specific action on tubercle bacilli can, therefore, be attributed to krysolgan. It is believed that this is in entire accord with the clinical findings, in which krysolgan is held to have an action of nonspecific type. It does not seem advisable that krysolgan should be given widespread use in tuberculosis of man.—*Die Heilwirkung des Krysolgan im Experiment, T. Koizumi, Ztschr. f. Tuberk., 1924, xli, 109.*—(*H. J. C.*)

Treatment of Tuberculosis with Krysolgan.—This drug has been found to exert a favorable influence on tuberculosis although a certain degree of reaction accompanies the administration. It has been used in connection with tuberculin and with pneumothorax.—*Unsere Erfahrungen mit Krysolgan bei Tuberkulose, Henius, Deutsche med. Wchnschr., April 3, 1925, li, 550.*—(*H. S. W.*)

Treatment of Pulmonary Tuberculosis with Triphal.—*Triphal* is a gold preparation that gives great subjective and frequently objective improvement in persons with pulmonary tuberculosis. It has no deleterious influence on the kidney or intestinal tract.—*Erfahrungen mit dem neuen Goldpräparat "Triphal" bei interner Tuberkulose, N. Galatzer and A. Sachs, Wien, klin. Wchnschr., May 28, 1925, xxxviii, 583.*—(*H. S. W.*)

Treatment of Pulmonary Tuberculosis with Krysolgan.—Krysolgan seems to be more beneficial than other specific remedies that have been advocated. But it should not supplant such measures as tuberculin or sunlight, and it is of no avail without the absolutely necessary hygienic-dietetic and rest regimen that is usually advocated in the therapy of tuberculosis. The earlier in the course of the disease krysolgan is begun, the better are the results. The early doses should be very small.—*Offener Lungentuberkulosen unter Krysolganbehandlung, C. Stuhl, Deutsche med. Wchnschr., October 17, 1924, 1, 1442.*—(*H. S. W.*)

Treatment of Tuberculosis with Colloidal Copper.—As a preliminary to chemotherapeutic studies in tuberculosis, animals were given intratracheal, intravenous and subcutaneous injections of colloidal copper preparations to determine histologically the cells that would absorb the copper. The results of experimental therapy with colloidal copper in tuberculous animals are believed to show a beneficial influence upon the pathological process.—*Studies on the Chemotherapy of Tuberculosis. Communication I. D. Iwansa, Kekkaku, 1924, xiii, nos. 3 & 4, Abstract from Japan Medical World, 1925, v, 162.*—(*M. M.*)

Treatment of Chronic Pulmonary Tuberculosis with Iodine.—The value of iodine in tuberculosis of lymph nodes led to the hope of similar beneficial action in the treatment of adult pulmonary tuberculosis. Before the war Bezançon and deJong, in an attempt to place such therapy on a rational basis, concluded from experiments on guinea pigs that iodine had no action on tuberculosis in these animals other than an aggravating one observed in some cases. Since the war the use of iodine in the treatment of pulmonary tuberculosis has been taken up and commented on favorably in certain journals. To form an accurate opinion of such treatment, 40 patients from the tuberculosis service of Ivry were treated with iodine. Of these there were 24 fibrocaseous cases, 15 fibrous cases, and one case of severe pleurisy. At first tincture of iodine was given by mouth, 20 drops a day in two doses, increasing four drops a day. Because more than 100 drops a day by mouth produced nausea and gastric disturbances, the drug was given intravenously in the form of iodo-methylate of hexamethylenetetramine, an ampoule of 2 cc. representing gr. 20 of the product, every other day for 20 injections, followed by a rest period of fifteen days. Generally the treatment was well tolerated, but in 9 cases severe hemoptyses, repeated over several days, were observed. Five had had hemoptyses previously, but the

other four had had no such accident prior to the iodine treatment. In 30 of the cases no favorable action, even temporary, was observed. In certain of the fibrocaseous cases and fibrous cases with secondary cavitation, in fact, the condition appeared to be made worse, with extension of physical signs. In the fibrous form it was more difficult to judge the results, but careful questioning of the patients, examination of the temperature curve, weight, sputum, and a comparison of the physical signs over a number of months, did not lead to the conclusion that there was any appreciable clinical improvement. Ten cases (6 fibrocaseous and 4 fibrous) appeared to receive temporary benefit, as manifested by gain in weight and diminution of asthenia and anorexia, but here too the value of iodine is problematical when one considers the benefit that may be acquired from hygiene and dietetic treatment alone. In the cases not treated by iodine there were just as many whose condition was improved by rest alone. Fever was uninfluenced by the iodine treatment. There was no diminution in the number of positive sputa, and there was a diminution in quantity of sputum in only 4 cases. It is certain that what falsifies the conclusions of those who praise this treatment is their ignorance of the various clinical forms of adult tuberculosis, without a knowledge of which any therapeutic attempt is worthless. All phthisiologists know that in the common cases of tuberculosis there is a tendency to relapses with periods of amelioration which is, however, only apparent, since stethoscopic and radiographic signs are unchanged. In the fibrous form, so little known by physicians and so common in cities, the advance of the disease is a matter of years with remissions and relapses. These cases have, in addition to signs of cavitation, a chronic bronchitis, the signs of which disappear for a time spontaneously and cause interpretation of the improvement as attributable to medication. It is possible and to be hoped that an efficacious treatment with iodine will be discovered. The present form of iodine treatment is not to be recommended.—*Valeur discutable du traitement iodé dans la tuberculose pulmonaire de l'adulte, S. I. deJong and J. Christophe, Presse Méd., April 8, 1925, no. 28, 449.*—(*E. H. K.*)

Treatment of Tuberculous Pyopneumothorax with Iodine.—Exudates in pulmonary tuberculosis are considered favorable, while in artificial pneumothorax they are viewed as undesirable complications. Treatment of tuberculous pyopneumothorax has been of little avail since no agents of sufficient disinfecting power and lack of irritation could be found. These requirements are, however, best fulfilled by Pregl's iodine solution, with which other authors have seen good results in tuberculous pyopneumothorax. The favorable action of the iodine solution on purulent pleuritis is attributed to the circumstances of a high CO_2 content of the pyopneumothorax, and that in laboratory tests CO_2 markedly activates Pregl's solution while on other iodine solutions no such action is noted. A reinforcing of the action of Pregl's solution by introducing CO_2 into the pleural space is superfluous, since a sufficient amount is present and any excess would be rapidly absorbed. The iodine in the Pregl solution is quickly combined by the tissues; therefore it is necessary after injection, by means of posture, to have the entire diseased pleura come in contact with the solution. The iodine action persists at most for 2 to 3 days, and therefore repeated injections are necessary. The pus in the pleura must be well rinsed out before introducing the iodine, especially when an empyema associated with a pulmonary fistula or rupture into a cavity does not exist. In these cases rinsing must be avoided on account of the danger of reinfection, and only small amounts of pus are removed, which are replaced by the Pregl solution. If the purulent exudate changes to a serous form, rinsing and subsequent nitrogen injection suffice for an early improvement.—*Zur Behandlung des tuberkulösen Pyopneumothorax mit Preglscher Jodlösung, U. Winkler, Beitr. z. klin. d. Tuberk., 1924, lix, 218.*—(*H. J. C.*)

Treatment of Spirochetal Pulmonary Gangrene with Arsphenamins.—Many cases of bronchopulmonary spirochetosis have been reported from Europe and the tropics, but in the United States, including 16 cases referred to in this paper, only 52 cases have been recorded. Animal experiments have shown that Vincent's spirochetes and fusiform bacilli may cause gangrene. Clinically, the sputum in cases of pulmonary gangrene of this type is jelly-like and blood-tinged, in some frankly hemorrhagic, in some purulent, and in others thin, brown, and foul-smelling. In only two of the cases observed did the washed sputum show tubercle bacilli. It always contained, however, numerous spirochetes, varying considerably in morphology and frequently associated with fusiform bacilli. Sixteen case records with clinical charts and X-ray pictures are included; also two autopsy reports. *Conclusions:* 1. At Mount Sinai Hospital, Cleveland, in the course of two years, 16 cases of pulmonary or pleuropulmonary spirocheto-

sis have been observed. This number gives a better idea of the incidence of this condition than the fact that only 52 cases have thus far been recorded in the literature of the United States. 2. In five of these cases in which definite gangrenous necrosis with cavitation was present, arsphenamin treatment apparently prevented death, and and resulted in practically complete disappearance of all symptoms referable to this condition. Five cases in which there was extensive pulmonary or pleuropulmonary gangrene, and in which no treatment was given or treatment when the patients were moribund, resulted unfavorably. In 5 of 6 cases in which there were less severe acute pulmonary lesions, arsphenamin treatment resulted in prompt cure. The sixth patient left the hospital after one injection of arsphenamin. 3. The onset of pulmonary gangrene in the course of any respiratory condition should be suspected when the sputum becomes brown and foul-smelling, and there is an increase in the severity of the existing signs and symptoms. 4. A diagnosis before any appreciable destruction has occurred may be made by the finding of Vincent's spirochetes and fusiform bacilli in the sputum (after careful washing). 5. Spirochetal pulmonary or pleuropulmonary gangrene can be prevented by eradicating the primary oral focus. 6. Spirochetal pulmonary gangrene is a distinct entity. It apparently develops as a result of the aspiration of spirochetes and fusiform bacilli from the oral cavity. It may be engrafted on any acute or chronic pulmonary condition, but is usually unrecognzed, principally because its symptoms, although characteristic, are attributed to the primary disease. It is a grave complication and if untreated is frequently the cause of death. Arsphenamin therapy is apparently as specific in this as in other spirochetal infections.—*Spirochetal Pulmonary Gangrene Treated with Arsphenamins, B. S. Kline and S. S. Berger, J. Am. M. Ass., November 7, 1925, lxxxv, 1452.*—(*J. B. A.*)

Treatment of Hemoptysis with Coagulen.—This is a report of a case of arrest of severe hemoptysis following the intrapulmonary injection of coagulen (Ciba). On April 23, 1925, between 10 and 11 P.M., a male patient with a large cavity at the right apex had a hemoptysis of a pint. The usual remedies were tried; such as absolute rest, injection of morphine, ice-bag, and tincture of ergot. A hemoptysis of 16 oz. followed between 4:30 and 5 A.M. next day, and a further one of 23 oz. at 9 A.M. During this attack 5 cc. of coagulen were given by subcutaneous injection; the patient almost immediately began to experience unpleasant sensations described by him as a feeling of knobs appearing all over the body. The hemorrhage gradually stopped about half an hour after the injection. At 1 P.M. the bleeding began again, about 12 oz. being lost in the first five minutes. At this time blood was welling up rapidly, about 6 mouthfuls being expectorated each minute; the patient had already lost 3.5 pints in about fifteen hours. Five cubic centimetres of coagulen were then injected directly into the cavity, over which bubbling râles were plainly audible. The spot chosen for the injection was the second interspace about 2 inches from the margin of the sternum. The needle was inserted to a depth of half an inch and the piston withdrawn, a mixture of air and blood immediately filling the syringe. The contents of the syringe were then injected; arrest of the hemorrhage followed with dramatic suddenness, only one more mouthful of dark, partially clotted blood being expectorated. At 3 P.M., however, the bleeding began again; another injection of coagulen (10 cc.) was given in the same spot; the hemorrhage stopped gradually about two minutes later, after a total loss of 10 oz. During the following night there were two slight hemorrhages of less than 5 oz., consisting mostly of clotted blood. Coagulen was not given. Recovery has been uneventful. The patient has regained his highest known weight, and is able to walk two miles with ease. Coagulen (Ciba), the substance used for injection, is prepared from the blood of animals. It consists chiefly of lipoids and is rich in thrombokinase. It has been used chiefly in surgery for the arrest of intractable hemorrhage, as described by S. G. Papadopolous in the *Lancet* of January 24, 1925, but has also been given by subcutaneous and intravenous injection for cases of hemoptysis. The intravenous method is more rapid and certain in its effects but tends to be associated with more or less severe shock. Intravascular clotting is said not to occur.—*Coagulen (Ciba) for Hemoptysis, A. J. Moreland, Lancet, June 13, 1925, ccviii, 1238.*—(*B. T. McM.*)

Treatment of Pulmonary Tuberculosis with Camphor (Hexeton).—In cases in which camphor treatment is indicated for pulmonary disease, *Hexeton*, an isomer, is recommended for injection in watery solution. The injections are given daily for 20 days in 1-cc. amounts and then for 10 days in 2-cc. amounts. After 3 to 4 weeks' rest the treatment is repeated. The injections are best tolerated by the intragluteal route. Infiltration or marked

pain was not observed.—*Über Kampferbehandlung der Lungentuberkulose mit Hexeton, Rowe, Ztschr. f. Tuberk., 1924, xi, 283.—(H. J. C.)*

Treatment of Tuberculosis with Camphor.—Camphor in one form or another has been used in the treatment of tuberculosis for a long time and often with some success. A new preparation of camphor, known as *Kamphokoniol*, is offered, as it has been found to exert a favorable influence on the disease because of its greater solubility.—*Ueber Kamphokoniol, ein neues lösliches Kampferpräparat, A. Neumann, Wien, klin. Wchnschr., February 12, 1925, xxxviii, 200.—(H. S. W.)*

Treatment of Pulmonary Tuberculosis with Oak-Bark (Cortalit).—The observation that tanners are especially insusceptible to tuberculosis has led to the use of oak-bark for treatment. *Cortalit* contains certain parts of the oak-bark for inhalation. The short period of experience, covering only 3 years, permits only conclusions as to the symptomatic action which was very definitely perceptible. It diminished the expectoration and the cough. No subjective or objective harmful action was observed.—*Erfahrungen mit dem Inhalationspräparat "Cortalit," H. Grass, Ztschr. f. Tuberk., 1924, xl, 287.—(H. J. C.)*

Treatment of Pulmonary Tuberculosis with Doctojonan.—Potassium arsenite-manganese-iodide, known as *Doctojonan*, has been used successfully for two years in the treatment of pulmonary tuberculosis. It does not produce severe reactions and may be used with impunity in very advanced cases. It is administered intramuscularly and in increasing doses up to a maximum and must be continued for a long time, even though favorable results are lacking in the beginning.—*Die Behandlung der Lungentuberkulose mit Doctojonan, T. Sandgraf, Deutsche med. Wchnschr., May 22, 1925, li, 871.—(H. S. W.)*

Pathological Changes in Lung from Mercurochrome.—This study was made on dogs to determine the tissue toxicity of mercurochrome and the pathological changes incident to its local use. In the preliminary series of experiments a series of 21 dogs was given intratracheal injections in 0.01 to 2 per cent concentration, by means of a syringe and needle. It was found that distinct pathological changes in the lungs were produced by concentrations as low as 0.1 per cent, ranging from a mild edematous and desquamative alveolitis to, with higher concentrations, hemorrhagic pneumonia with focal abscess and tissue necrosis. Then a series of 8 dogs was given right-sided intrapleural injections of the drug in 0.1 to 2 per cent solution, 5 to 10 cc. Here also in the lower concentrations there resulted a transient dry fibrinous pleurisy, and in the higher, hemorrhagic pleural exudates and pneumonia. *Comment and conclusions:* Mercurochrome-220 soluble, from 0.5 to 2 per cent solution, injected subcutaneously, intratracheally and intrapleurally, produces profound pathological tissue changes, which in the lungs result in permanent parenchymal damage. It would, therefore, seem inadvisable to treat pulmonary conditions, especially cavities, by such injections, and the use of over 0.1 per cent concentration in empyemas is warned against.—*Pathologic Changes in Lung from Use of Mercurochrome-220 Soluble, H. J. Corper, J. Am. M. Ass., July 25, 1925, lxxxv, 256.—(A. P.)*

Tuberculin.—It is a striking fact that preparations of tuberculin, although exceedingly active with respect to the tuberculous animal, are quite without effect on the normal animal. No explanation yet given for this striking difference in toxicity has met general acceptance. The tissue changes of the tuberculin reaction exhibit two characteristic features, namely, exudation and necrosis. The exudate that pours out consists of plasma and cells, and is associated with active hyperemia. The cells are chiefly large mononuclears, and when arranged in the characteristic architecture of the tubercle appear identical with the epithelioid cells. The necrosis of the sensitized cells has been regarded by a number of workers as the result of an interaction between sensitized tissue, that is, the tissue of an infected animal, and the active principle of tuberculin, whereby the latter is rendered toxic. Experiments by the authors and others have failed to confirm this theory. Taking advantage of the fact that the testis of the tuberculous guinea pig is highly sensitive to the action of tuberculin, the crushed testis from such an animal and old tuberculin were intimately mixed and incubated for six hours. The preliminary results indicated that the tissues of the sensitized animal do not act on tuberculin in such a manner as to render it toxic for normal animals, nor do they bind the active principle in appreciable quantity so as to render a tuberculin preparation less toxic for another tuberculous animal. Identical results were secured when the ground skin of a tuberculous animal was substituted for the testis. These results are in agreement with those of Selter, who has repeatedly

asserted that tuberculin is a specific irritant for the sensitized cell, which poisons the cell without, however, being bound by it. A study of the chemical composition of the active fractions of tuberculin was made. For this purpose, tuberculin, made from tubercle bacilli grown on a special medium devised by Long and containing no protein or peptone, was used. Experiments showed that when this tuberculin is suspended in a dialyzing membrane, the active principle does not dialyze out, although all the original constituents of the medium dialyze readily. The substance is thus to be considered a colloid or something firmly adsorbed by a colloid. In the light of the second possibility an attempt was made to bind the active principle by a known effective adsorbent. For this purpose animal charcoal was used. The results obtained indicated that if the substance was in an adsorbed combination, charcoal failed to free it; or, on the other hand, that it might be a colloid itself, not adsorbed, at least under the conditions of the experiment. The nondialyzing colloid which shows tuberculin activity is of protein nature. Tuberculin prepared from the protein-free medium invariably contains protein after a few weeks' growth of the bacillus. The fact that the activity of the preparation is destroyed by trypsin strongly suggests, if it does not prove, that the substance which is active is actually a protein. If the active principle is merely adsorbed by protein, and is not a protein itself, destruction of the protein by ferments would not impair the activity of the preparation. Various special fractionating methods have led to the separation of active and inactive proteins. Treatment with acetic acid gave incomplete precipitation, whereas complete saturation with ammonium sulphate was found to precipitate completely the active principle and all the protein. This precipitate was separated with three protein fractions: (1) a water soluble, heat-coagulable potein; (2) a noncoagulable, alkali-soluble water-insoluble protein; and (3) a noncoagulable water-soluble protein. The first of these possesses moderate activity, the second little, if any, and the third marked potency. One-ten-thousandth milligram gives a strong tuberculin reaction in the testis of a tuberculous guinea pig. The authors are unable as yet to state whether the proteins so obtained are identical with the protein of the tubercle bacillus, long known to be as potent as tuberculin, or whether they represent a special secreted product. This matter is now being determined. The results obtained by this investigation confirm the view of other investigators that the active principle of tuberculin is itself a protein.—*Tuberculin: Chemical Composition of the Active Principle and the Nature of the Tuberculin Reaction, E. R. Long and F. B. Seibert, J. Am. M. Ass., August 29, 1925, lxxxv, 650.*—*(J. S. W.)*

Tuberculin Treatment.—Tuberculous infection brings about an immunity which, even if it cannot blot out the focus of the disease itself, protects the other tissues and organs of the body. Reinfection in tuberculosis produces a local reaction that is similar to the tuberculin reaction in infected animals. No lasting immunity to tuberculosis can be established. How can one use tuberculin therapeutically without doing damage to the patient? That tuberculin contains specific antigens cannot be gainsaid. Treatment with tuberculin will increase the number of antibodies. In treatment the aim should not be to increase dosage as rapidly a possible and thus produce tuberculin insensitiveness, as many seek to do. Such a procedure does harm. It is only in those cases in which the tuberculin sensitiveness recedes ever so slowly that tuberculin therapy does good. This is effected through antibody agency. There are two questions of importance in considering the future of tuberculin therapy, namely, (1) selection of a suitable tuberculin and (2) a satisfactory technique. All tuberculins are not of the same value. A tuberculin should not only be specific but it should be as free as possible of toxic substances. As to technique, the subepidermal injection method is the one of choice. The method localizes the immunizing properties in the skin so that the general organism gets only the secondary effect of the immunity which develops in the skin reactions.—*Vergangenheit und Zerkunft der Tuberkulinbehandlung, H. Sahli, Deutsche med. Wchnschr., December 15, 1924, l, 1714.*—*(H. S. W.)*

Treatment of Tuberculosis with Tuberculin.—Much of the theory on which specific therapy in human tuberculosis is based has come from animal experimentation, and has been taken as a proved fact, instead of theory, and has at times done harm. Tuberculin has been thought to be an agent that neutralizes the poisons formed by the tubercle bacillus and has been used as a specific remedy against tubercle bacilli. Other well-known specific measures that have been used in tuberculosis are serum therapy, infection of animals with human bacilli, inoculation of animals and man with large numbers of cold-blooded, nonpathogenic acid-fast bacilli. But resistance against the infection can be set up only by

infection with virulent tubercle bacilli, and, if the focus established by these bacilli is completely healed, immunity disappears. Therefore, tuberculin is a specific remedy only when introduced into the tuberculous. The effect of tuberculin upon the tuberculous focus is specific and very great, and its administration must be done with very great care. The reaction produced at the focus by tuberculin becomes less and less as tuberculin therapy is continued. It is a valuable therapeutic medium, but there are many grounds for error and danger. Tuberculin may be administered with benefit to the patient, but it must be used very cautiously.—*Spezifische und unspezifische Behandlung der Tuberkulose, P. Jungmann, Klin. Wchnschr., October 7, 1924, iii, 1863.*—(*H. S. W.*)

Treatment of Tuberculosis with Phlogetan.—Phlogetan, thought to be a good substitute for tuberculin, which will produce mild focal reactions without doing the patient harm, is reported as giving excellent results when applied clinically to 24 cases of tuberculosis.—*Ueber die Behandlung der Tuberkulose mit "Phlogetan," N. v. Bornhaupt, Wien. klin. Wchnschr., August 27, 1925, xxxviii, 958.*—(*H. S. W.*)

Vaccines and Bacteriotherapy in Pulmonary Tuberculosis.—Numerous attempts at immunization against tubercle bacilli have been made since Koch's original tuberculin was introduced in 1890. A great obstacle to the determination of the action of a vaccine in tuberculosis is the nature of the disease, which may heal spontaneously under simple rest treatment. Altogether, this has been one of the most arid fields of investigation. *Review of sera and vaccines:* Among the first of the former were the sera of Maragliano, Marmorek, Vallée, Ruppel and Rickmann, Bruschettini, Joresset, and Spengler, all prepared by injecting animals either with tuberculin, or human tubercle bacilli, dead or alive, or both. However, the quantity of "antibodies" produced seems a poor criterion of immunity, since they are present in many patients with active progressive disease. Moreover, none of these sera either cure or prevent the disease in guinea pigs, although they may retard death. Calmette thinks they act like small doses of tuberculin. He finds that sera rich in antibodies may mobilize bacilli and hasten the progress of the disease. "Hypervaccinated" animals, he finds have no power to destroy tubercle bacilli. The various tuberculins have numerous partisans and detractors, and appear to influence lymphatic and bone tuberculosis more than pulmonary. They have no preventive action. Wright, however, has obtained undeniable therapeutic results at the clinic of St. Mary's Hospital, London, by injections of emulsions of heated bacilli (at 60°C.). The opsonic index is raised as cure occurs. Preliminary rest is given. Vaccines prepared by emulsifying bacilli with chemical lipoid solvents have been tried, but it is likely that the bacillary protoplasm is too much changed thereby. Vaccination with live bacilli was tried on cattle by Behring and by Arloing. The latter's experiments were interrupted by his death. In Belgium Jacquet has produced a vaccine from caseous material which, he avers, induces agglutination of tubercle bacilli by the serum of patients injected. Calmette has devised a scheme for injecting minimal numbers of bacilli at intervals. Later he and Guérin were able, after about 70 passages on biliated media, to produce an organism of low virulence, innocuous but capable of producing antibodies and agglutinins. Herman, of Mons, has prepared a vaccine by emulsifying bacillary powder in paraffin fusible at 50°C. and keeping it a week in the incubator at 65°C. The work of Besredka shows that there exists in very old cultures of certain organisms a substance termed "antivirus," which resists heating to 120°C. and possesses on local application destructive power against the corresponding organism. Bertrand thinks he has obtained the same thing from the exudate of old tuberculous lesions and has attempted to use it in certain localized forms of tuberculosis, with encouraging results. Meanwhile, he believes Wright's method deserving of more consideration.—*Vaccins et bactériothérapie dans la tuberculose pulmonaire, Bertrand, Rev. Belge d. l. Tuberc., February, 1925, no. 2, 40.*—(*A. P.*)

Dreyer's Tubercle Antigen and Experimental Tuberculosis.—These experiments were to have been preliminary to a more extensive investigation, using a much larger number of animals inoculated with material of varying degrees of infectivity, and with adequate controls. The results of the preliminary study, however, were so discouraging that it was felt that the labor and expense of a more elaborate investigation was not justified. It is recalled that Dreyer devised a method of removing the lipoidal substance from the tubercle bacillus, rendering it nonacid-fast. Several extractions with the Soxhlet apparatus are necessary to accomplish this. Dreyer, in his own experiments, treated four infected guinea pigs, three being the sole survivors of a group of twenty-five inoculated with a virulent

human strain of tubercle bacilli. Thus Dreyer used for treatment the most resistant animals of the lot and there were no real controls. Not only was treatment not begun until the animals had already manifested marked resistance but the germ used had not passed through an animal for fifteen years. Kettle and Caulfeild appear to have been the only others to report experiments with Dreyer's antigen, and their results were negative. In the present experiment the antigen was prepared according to Dreyer's technique from a Board of Health strain (305) of tubercle bacilli known to be of medium virulence. Altogether 25 guinea pigs were used, including 4 controls and divided into three groups, according to the method of infection, bovine bacilli being used in the third group. The initial dosage of the vaccine was only one-fourth that employed by Dreyer, in order to test its toxicity, but later was run up to the 0.2 mgm. used by Dreyer. Treatment was begin much earlier, usually before enlargement of the lymph nodes, and in nine guinea pigs before infection. It was injected weekly into the subcutaneous tissue of the abdomen as a rule. All the animals died with postmortem evidences of generalized tuberculosis, and the course was apparently the same in the treated animals and controls. Two observations indicated some toxic or sensitizing quality of the antigen: (1) the tendency for earlier enlargement of lymph nodes, and (2) cessation of treatment was often followed by gain in weight. *Conclusion:* A study of the course of the disease in a group of 25 experimentally infected guinea pigs, of which 12 received therapeutic vaccination with Dreyer's antigen and 9 both prophylactic and therapeutic vaccination, 4 serving as controls, failed to adduce any evidence of protection against tuberculosis, prolongation of life or favorable influence on the disease.—*Dreyer's Tubercle Antigen: Experiments Showing the Failure of the Antigen to Protect Guinea Pigs against Experimental Tuberculosis, H. M. Feinblatt and A. H. Eggerth, Arch. Int. Med., July 15, 1925, xxxvi, 121.*—(*A. P.*)

Dreyer's Antigen in Experimental Tuberculosis.—Under Calmette's direction Grasset undertook to repeat Dreyer's experiments with tuberculized guinea pigs. The antigen was obtained from a 2 or 3 weeks' old culture of tubercle bacilli, by formaldehyde extraction at 40 volumes, for 4 hours in the water-bath, with acetone extraction of the residue for 24 hours at 65° The bacilli, rendered nonacid-fast and Gram-negative, were washed, dried and weighed, and a saline emulsion prepared and standardized at 1/50 mgm. per cc. A lot of 45 guinea pigs of 400 to 500 gm. weight was inoculated subcutaneously with a dose of 0.1 mgm. each of bovine bacilli (Vallée), representing about 4000 bacilli. Of these, 31 were treated, and 14 were controls. Treatment was begun 5 weeks after infection, when a slight lymphatic reaction was apparently, and a series of 9 subcutaneous injections of 0.5 cc. of antigen given, the interval being at first two weeks, later one week. The injections were accompanied by local reactions lasting 2 to 6 days. At the third injection several animals presented large inguinal lymph-node swelling of the side injected. Examination at the sixth injection showed in two-thirds of the animals one or more greatly swollen inguinal lymph nodes, often bilateral. During the period of the last three injections 4 treated animals developed cold abscesses. The average period of survival of the treated and control animals differed little, each showing individual variations. Comparative postmortem examination showed a predominance of widespread lymphatic lesions in the treated animals, with enormously enlarged spleens. The pulmonary and hepatic localizations were, however, less marked. The weight curves of the two groups showed nothing striking. These results do not appear to indicate the production of an acquired immunity such as Dreyer thought. Neither evolution nor duration of infection appears to be influenced, but only its anatomical character, the modifications of which were similar to those observed under the influence of Koch's Old Tuberculin.—*L'antigène (diaplyte) de Dreyer en médecine expérimentale, E. Grasset, Rev. de la Tuberculose, June, 1925, vi, 355.*—(*A. P.*)

Karfunkel's Vaccine in Tuberculosis.—Karfunkel's vaccine, a preparation from a nonacid-fast root bacillus, was not found to be of value in 4 cases of childhood tuberculosis treated with the material.—*Erfahrungen mit dem Tuberkuloseheilmittel "Vaccine Karfunkel," F. Gierthmühlen, München. med. Wchnschr., June 19, 1925, lxxii, 1028.*—(*E. R. L.*)

Treatment of Tuberculosis with Ectebin.—Ectebin was used in 40 children. Favorable results were seen in children with scrofulous eye conditions and in children infected with tuberculosis and suffering from persistent enuresis resulting from tuberculotoxin action. In latent lymph-node and pulmonary tuberculosis, hygienic-dietetic measures achieved as much as did ectebin. In other forms of tuberculosis ectebin possessed no advantages over other tuberculins. It is not harmless, and produces

fever and focal reactions like any tuberculin. Caution is advised in its use in ambulant practice. No ectebin treatment should be instituted without roentgenological control or repeated determinations of the sedimentation rate of the erythrocytes.—*Zur Frage der Ektebinbehandlung, E. Klinckmann, Beitr. z. klin. d. Tuberk., 1924, lviii, 414.*—(*H. J. C.*)

Treatment of Tuberculosis with Tebeprotin and Ectebin.—Tebeprotin Toenniessen was used in 22 cases diagnostically and 38 cases therapeutically. Of the former 13 reacted positively and 9 negatively. There occurred 7 focal reactions, observable after 24 hours and exhausted after 2 to 3 days. The general reaction disappeared at most within 3 days. Three markedly positive cases became completely free from symptoms of reaction only after 7 to 9 days. Of the 9 negatively reacting cases 3 were inactive, and 5 were mild fibrous forms. One exception was in a case of hilum tuberculosis with mediastinal tumor and positive bacillary findings, which in spite of repeated injections reacted negatively. Thirty-three patients were treated, according to the directions of Toenniessen, with increasing doses of three solutions; 28 gained weight and 10 subfebrile cases became free from fever; 16 positive cases became bacilli-free. As a whole, the general condition improved, except in two who became worse and one who remained stationary. Among predominantly fibrous forms, 19 had reactions, 9 developing a focal reaction, 3 had high fever and focal reaction with a progression of the process, and 2 of these were exudative cases. Tebeprotin proved a valuable diagnostic agent. Ektebin was used according to the directions of Moro; 96.6 per cent of the fibrous cases and 70 per cent of the exudative cases improved. The period of treatment was shorter in the fibrous than in the exudative cases. At times old inoculation sites flared up. As a whole ektebin was well tolerated, and in many cases it had a favorable influence. Productive fibrous cases are best suited for treatment, while in exudative cases caution is advised.—*Über Behandlung der Tuberkulose mit Tebeprotin und Ektebin, F. Baumann, Beitr. z. klin. d. Tuberk., 1924, lix, 13.*—(*H. J. C.*)

Treatment of Tuberculosis with Ertuban.—Ertuban is a tuberculin-like substance, differing from Old Tuberculin in that it is free from media or parts of tubercle bacilli. It contains only those products of tubercle bacilli that are soluble in water at 37°C. It is a clear solution giving typical tuberculin reactions. In therapy it sometimes gives results in cases in which no improvement has been forthcoming from the use of other tuberculins. Too large a dose is harmful, although improvement follows a single slight reaction. There is no parallelism between the degree of the reaction and the state of the disease, but between the intracutaneous reaction and the minimal reacting dose there is a relationship.—*Therapeutische Versuche mit Ertuban-Einspritzungen bei Tuberkulose, H. C. Mueller, Deutsche med. Wchnschr., February 20 & 27, 1925, li, 305 & 355.*—(*H. S. W.*)

Treatment of Pulmonary Tuberculosis with Ponndorf's Method.—The leucocytes were followed in 25 cases treated according to Ponndorf. After the first treatment a considerable number of patients developed marked skin and general reactions. In 5, focal reactions developed which did not rapidly retrogress. Among 18 the second inoculation resulted in even more violent reactions, and in 11 focal reactions occurred that had not terminated in 7 weeks. Of 6 inoculated the third time, there developed 2 focal reactions. General, skin and focal reactions showed no definite relationship. The leucocytes, even in favorable processes and with slight involvement, reacted markedly with small doses. Besides an increase in the leucocyte count there was a marked shifting of the neutrophiles, lymphocytes and eosinophiles. The neutrophiles increased up to 85 per cent of the total count. Increases of 32 per cent were observed, and 15 to 20 per cent increase was not rare. A shift to the left, besides the occurrence of young forms and myelocytes in the circulating blood, was noted. The lymphocytes diminished as much as 12 per cent, and in marked reactions there occurred regularly a diminution of the eosinophiles, at times to complete absence. Mast cells, in violent reactions, increased up to 2.1 per cent. After 8 hours following the inoculation the changes were definitely discernible, and they reached their height at 24 hours. In a second phase there occurred a diminution of the neutrophiles and an increase of the lymphocytes, as well as of eosinophiles. The clinical and cytological observations would not permit concurring with Ponndorf's view that stimulation by the toxin of the skin causes a liberation into the body fluids of protective substances. In many cases of tertiary tuberculosis the procedure, when performed even more mildly than Ponndorf described, is not free from danger, because the crudeness in dosage and the variability of the resorption power of the skin make it impossible to know just

how much tuberculin enters the body fluids.—*Klinische und cytologische Beobachtungen bei der Cutanbehandlung der Lungentuberkulose nach Ponndorf, H. Gödde, Beitr. z. klin. d. Tuberk., 1924, lix, 116.*—(*H. J. C.*)

Treatment of Tuberculosis with Artificial "Antibodies." One-half to one-year-old tubercle-bacillus cultures in glycerine bouillon, prepared from lamb muscle or liver, were hydrolyzed for one to two weeks in the incubator with 5 per cent potassium hydroxide, after which the tuberculotoxins, combined with nucleins, were precipitated out by the addition of concentrated phosphoric acid, and then filtered. To separate the phosphoric acid the filtrate was dialyzed through gelatine, neutralized, and again dialyzed, after which it was electrolyzed for 48 hours, filtered, neutralized, and again dialyzed, finally being sterilized by means of filtration. Guinea-pig and rabbit experiments are reported, and in man the initial dose of 1 to 2 cc. is increased to 10 to 20 cc., given every four to five days. More than 30 cases of lupus were favorably influenced. Favorable results are also reported in bone and lymph-node tuberculosis. Twenty cases of first-stage pulmonary tuberculosis were freed from fever, cough and sweats. The objective findings remained stationary. Only a few cases improved definitely after 2 to 3 years.—*Über die Methodik der Zubereitung von kunstlichen Antikorpern (Antitoxinen) zur Behandlung der Diphtherie und Tuberkulose, G. A. Smirnow, Beitr. z. klin d. Tuberk., 1924, lix, 278.*—(*H. J. C.*)

Treatment of Guinea-Pig Tuberculosis with Specific Vaccine.—If tubercle bacilli are carefully warmed *in vacuo* after the addition of sodium hydroxide and acetone, a vaccine can be prepared which produces no reaction in large doses after injection into guinea pigs and healthy human beings. In guinea pigs infected with tuberculosis the course of the disease is favorably influenced. Lymph-node enlargement and cavity formation of the lungs is improved by connective-tissue formation. In place of predominantly exudative forms of guinea-pig tuberculosis there occur fibrotic proliferative forms in treated animals. Whether tuberculosis in man can be likewise influenced cannot be determined from animal experiments.—*Heilversuche bei experimenteller Meerschweinchentuberkulose, G. Seiffert, Beitr. z. klin. d. Tuberk., 1924, lviii, 362.*—(*H. J. C.*)

Treatment of Pulmonary Tuberculosis by Inhalation of Carbon, Lime and Silicic Acid.—All methods of treating pulmonary tuberculosis aim at the stimulation of connective tissue. The inhalation of carbon, lime and silicic acid are of little avail, since the dust lodges mainly in the healthy lung tissue, and it is unnecessary to stimulate connective-tissue formation in this location. An attempt, however, is made by the author to blow the dust directly into the diseased lung tissue by means of the bronchoscope. The results are to be reported at a later date.—*Die Behandlung der Lungentuberkulose vermittels Einatmung von Kohle, Kalk und Kieselsäure. (Bemerkungen z. gleichmämigen Thema von Prof. Dr. A. Kühn, Rostock), K. Henius, Beitr. z. Klin. d. Tuberk., 1924, lix, 313.*—(*H. J. C.*)

Emulsions of Testes and Adrenals in Treatment of Tuberculosis.—According to some investigators, the suprarenals react by hypertrophy in cases of feeble or slowly developing tuberculosis, and by sclerosis and atrophy in the severer forms of this disease. In many cases tubercle bacilli could not be detected in the affected adrenals; therefore, these changes could only be explained by the influence of the poisons of the bacilli. Adrenal insufficiency seems to occur in many severe and chronic infectious diseases and in intoxications. There is no doubt that the sexual glands have an internal-secreting function. Brown-Sequard and his followers claimed to have shown that testicular injections have a stimulating influence on the general strength of the animal, and especially on the sexual organs and their function. The rôle of the sexual glands in infectious diseases and in intoxications has been very little investigated. There is some experimental evidence that hypertrophy of the interstitial gland of the testicle occurs in the first stages of tuberculosis, with a tendency to atrophy in severe tuberculosis. According to some, the specific habitus of a consumptive is due to the disturbance in the function of the interstitial gland. With the above-mentioned facts in view, preparations of sexual glands plus adrenals were administered to tuberculous patient with symptoms of deficiency of internal secretion of sexual or adrenal glands to enable them to overcome this disease. For this purpose glycerine emulsions of perfectly fresh testes and adrenals of cattle were used and administered orally for a considerable period. At first the aim was to administer the emulsions only to those patients (males ?) who suffered from tuberculosis with symptoms of deficiency chiefly of the sexual glands. But it was difficult to find a sufficient number of suitable cases because marked changes in the external appearance can only be seen in those in which deficiency started at an early

age. Therefore, the emulsion was also given to patients without any signs of sexual deficiency. In addition fourteen senile patients (nontuberculous) received the adrenalin-testes emulsion. The results for all cases were practically negative, indicating that the oral administration of adrenalin-testes emulsion is without therapeutic value as used above.—*Observations upon the Influence of a Glycerine Emulsion of Testes and Adrenals on Tuberculous and Senile Patients, V. V. Korenchevsky, Lancet, November 21, 1925, xxix, 1056.*—(*J. S. W.*)

Effect of Spleen Extract and Bone-Marrow on Blood in Pulmonary Tuberculosis.—Leake and Evans have described the results obtained by them in the treatment of anemia in medical and surgical cases by the oral administration of spleen extract and bone-marrow, and Dunham recently reported favorable results in 21 of 23 cases of pulmonary tuberculosis so treated. In this article another series of 23 cases was treated and the blood picture carefully observed by one individual. The spleen and bone-marrow were administered in capsule form three times daily, a half-hour before meals. Weekly blood counts were made during a one-month control period and a two-month period of treatment. Hemoglobin determinations were made with a Bausch and Lomb colorimeter and the counts with a Levy hemocytometer. Leake and Evans' criteria were used to classify the improvement observed as follows: less than 5 points improvement in hemoglobin and 250,000 red cells, no improvement; 5 to 10 points hemoglobin increase and 250,000 to 500,000 red cells, slightly improved; 10 to 15 points and 500,000 to 1,000,000, moderately improved; more than this, markedly improved. Of the 23 cases, 11 were markedly improved, 7 moderately so, and 3 slightly so. Preliminary counts on 261 patients at Oak Forest Tuberculosis Hospital, showed only 14 per cent to have 90 per cent or more hemoglobin and red cells above 4,800,000. A further study and use of this preparation in tuberculosis seems indicated.—*The Effect of Spleen Extract and Bone Marrow on the Blood Picture in Pulmonary Tuberculosis, R. W. Dunham, Amer. J. M. Sc., September, 1925, clxx, 394.*—(*A. P.*)

Bronchial Drainage by Posture.—To utilize gravity in bronchial drainage the bifurcation of the trachea must be lower than the bronchi. With this accomplished with the patient on his back, however, the secretions tend to collect in the pharynx and nose, while in the prone position the chief disadvantage is that there is interference with the expansion of both lungs. The lateral posture is considered best, for the above disadvantages are avoided, and the patient can expectorate easily. The angle required to assure drainage of both bronchi is greater, but by arranging the pillows in the form of a double inclined plane, with the highest point just below the ribs, the patient may be made comfortable, and there is no undue rush of blood to the head. In profuse hemoptysis it is imperative that free drainage be secured, lest the patient drown in his own blood. An illustrative case with necropsy is cited in which no attempt was made at postural drainage, and is contrasted with another in which drainage was secured and the patient recovered. If it is certain from which side the blood is coming, the bleeding side should be uppermost. Care should be taken that the bronchus of the lower side is at a drainage angle. The bronchial-drainage posture may be useful in pharyngeal palsies, such as occur in diphtheria. While there is diaphragmatic paralysis, care must be taken to have the highest point of the inclined plane as far above the abdomen as possible, to prevent the abdominal contents from impeding respiration. While no cases are cited, it is considered that such drainage would be of value in some instances of bronchiectasis. Hypostatic pneumonia might be avoided in certain cases if this procedure were resorted to, while in the terminal stages of uremia, pneumonia or miliary tuberculosis, the death râle, so disconcerting to a ward of sick people, can be stopped.—*The Uses of Posture for Bronchial Drainage, N. Neild, Brit. M. J., September 19, 1925, no. 3377, 504.*—(*E. H. K.*)

Interruption of Pregnancy in Tuberculosis.—There are cases in which women with chronic tuberculosis pass through pregnancy not only without harm, but on the contrary with a favorable influence upon the disease. All of these cases fall into a disease class characterized by purely indurative processes in an organism which constitutionally and conditionally exists under unfavorable conditions. Never, however, has the author seen a favorable influence of the pregnancy upon prognostically questionable or outspoken progressive tuberculous processes. For the interruption of pregnancy in tuberculosis Hayek leans to the scheme of Winter and Waldstein, without, however, agreeing in all details. In the question of interrupting pregnancy the condition of the entire body is the most important factor. Placing complete faith in the roentgen examination is warned against. Careful

observation over a long period of time is advised. The entire question cannot be considered only from a medical standpoint, but must also be viewed in its ethical, religious and legal aspects. The prognosis in one and the same type of disease will vary, according to the economic condition of the patient, as well as the stage of pregnancy, and on the circumstances required for the care of the child.—*Über Schwangerschaftsunterbrechung bei Tuberkulose. (Fine sozialmedizinische Studie.), H. v. Hayek, Beitr. z. klin. d. Tuberk., 1924, lviii, 451.*—(*H. J. C.*)

Radical Interruption of Pregnancy in Progressive Pulmonary Tuberculosis.—Total extirpation of the pregnant uterus is indicated in progressive cases of tuberculosis when there are no cavities determinable in the lungs, when the pregnancy has not progressed beyond the fourth or at most the sixth month, and when the woman is psychically normal and possibly has living children. From 1908 to 1922, 56 women were thus operated upon and, of these, 3 could not be traced, 16 died, 32 improved, 3 were unfavorable and 2 unchanged. The results of abortion were less favorable. Of 45 women, 17 died, 16 were unfavorable, in only 8 the disease was arrested, and 4 were lost track of.—*Der Einfluss der Totalexstirpation der Uterus und der Adnexe auf die fortschreitende Lungentuberkulose Schwangerer, J. Misgeld, Centralbl. f. Gyn., 1924, xlviii, 1438.*—(*H. J. C.*)

Radical Interruption of Pregnancy in Pulmonary Tuberculosis.—Supravaginal hysterectomy with extirpation of the adnexa was performed in 26 cases of pregnancy occurring with tuberculosis. The cases were observed for five years; 20 improved, 4 remained unimproved, and 2 were lost track of. Of the improved 12 are considered healed, while one had a recurrence after two and one-half years, and in 7 improvement continued in more or less complete form. The 4 unimproved died in from one to eleven months. Supravaginal amputation with coincident sterilization is considered the best procedure for the interruption of pregnancy in tuberculosis. A marked adiposity, after the removal of the adnexia, did not occur in any of the cases. Sterilization is considered essential, not only to prevent the harm of further pregnancies, but also the detrimental influence of menstruation. The procedure should be undertaken only in the second to fourth months of pregnancy.—*Die Erfolge der supravaginalen Amputation und Kastration bei tuberkulösen schwangeren Frauen, F. Siegert, Ztschr. f. Geburtschk., 1924, lxxxvii, 479.*—(*H. J. C.*)

X-Ray Findings in Uncommon Causes of Hemoptysis.—Phthisis and mitral disease, the most common causes of hemoptysis, are not considered in this paper, which is based on 495 cases referred from the wards and outpatient department of the Massachusetts General Hospital for roentgenological examination of the chest. Among the uncommon causes of this symptom may be mentioned lung abscess, neoplasm, bronchiectasis, foreign bodies, chronic bronchitis with asthma, pneumonokoniosis, chronic infections due to actinomycosis, blastomycosis, streptothricosis, pneumonia, syphilis, and acute lymphatic leukemia. The literature on the subject is reviewed. The importance of roentgenoscopy and stereoscopic study of roentgenograms in revealing a pulmonary lesion and its probable nature is emphasized. A careful correlation of the roentgenological findings with both the clinical and laboratory data usually makes a diagnosis possible. A number of cases in which there was blood-streaked sputum or frank hemoptysis are cited. The first is a case of lung abscess with typical history and findings. In the second case radiographic findings were suggestive of fluid associated with an infiltrating process of the left lung. The condition eventually proved to be probable malignant tumor. The third case showed an increased density at the left lung root which extended outward a little beyond the midchest. In view of the history of syphilis, in the presence of a productive cough with profuse hemoptysis, and with sputum constantly negative for tuberculosis, the lung condition was considered probably syphilitic. The fourth case presented a picture of a chronic fibrosing process of both lungs consistent with bronchial asthma, which agreed with the history and physical findings. The fifth was a lung abscess, presumably from aspiration of a nonopaque body during a convulsion. In the sixth case there had been black, blood-streaked sputum. The case was considered as pneumonokoniosis because of a long occupational history of exposure to dust, negative family history and past history for tuberculosis, extensive fine mottlings in both lungs with clinical history lacking to account for them, and negative sputum for tuberculosis. Lobar pneumonia and bronchiectasis are also discussed. The saccular type of the latter is highly hemoptoic in contradistinction to the cylindrical type. In a well-advanced case of bronchiectasis there is extensive thickening of the lung markings along the course of the larger bronchi, and enlargement of the hilum lymph nodes. In the lung fields there are single or multiple areas of increased density, which show considerable change in films

taken before and after evacuation. In the early stages, small, ring-like shadows of dilated bronchi may be seen; later, cavities may be demonstrated. The mycotic infections may occur in the form of abscess, but the diagnosis depends on bacteriological investigation.—*Roentgen Findings in the Uncommon Causes of Hemoptysis, P. S. Beilin, Am. J. Roentgenol. & Radium Ther., October, 1925, xiv, 304.*—(*E. H. K.*)

Spirochetes in Hemoptoic Tuberculous Sputum.—Two hundred and thirty-nine specimens of sputum were examined to determine whether the special spirochete observed by Etchegoin in bloody tuberculous sputum was met with in other circumstances. The spirochete was found only in bloody expectoration, and in 26 of these cases the tubercle bacillus was also demonstrated. The differentiation of this spirochete from those of the mouth or respiratory tract is best made with the ultramicroscope. It is thicker and less motile than the bronchial spirochete of Castellani and does not resemble the type found in Vincent's angina. It must be classed as intermediate between the bronchial and buccal types.—*Présence de spirochètes dans les crachats hemoptoiques des tuberculeux, Bezançon and Etchegoin, Meeting, Soc. de Biologie de Paris, Jaduary 17, 1925, reported in Presse Méd., January 24, 1925, no. 7, 103.*—(*E. H. K.*)

Acute Consolidation of Lung.—Lobar pneumonia begins as a consolidation in the hilum region and spreads rapidly. In upper-lobe involvement the shadow is very dense, and its lower border quite sharply marked off; in middle-lobe consolidation the shadow is not so dense, its upper border is sharp and its lower border "feathers out." Lower-lobe consolidations are much larger and tend to "feather out" into thin irregularly shadowy edges above and below. A markedly rapid return to normal follows the crisis, and seven to ten days after this event the lung shadow usually appears normal. A shadow persisting as long as three weeks after the crisis represents a complication. Hilum pneumonia is probably an abortive lobar pneumonia, although the clinical course is like that of lobar pneumonia. Acute caseous tuberculous pneumonia closely resembles acute lobar pneumonia, both clinically and radiologically. Failure of the occurrence of a crisis and the relative chronicity of the process, often with cavitation developing after a few weeks, are leads, and the presence of tubercle bacilli in the sputum, especially later in the course of the disease, is absolute evidence of the tuberculous nature of the process. Later bronchial extension and frequently death occur. Acute abscess of the lung usually starts toward the hilum as a dense shadow, and advances peripherally without regard to lobation. Cavity formation within a few days of the onset clinches the diagnosis. If the abscess ruptures into the bronchus a rapid subsidence of the process often occurs. Spontaneous cure usually does not follow a lung abscess as old as four weeks. Patients frequently have relatively mild symptoms with large chronic abscess of the lung. In many cases symptoms are much like those of chronic pulmonary tuberculosis. Differentiation of pulmonary conditions such as these must be made not alone by the X-ray but by correlation of the clinical picture and symptoms and signs with the radiogram, but helpful analysis of the shadows in various acute consolidations of the lungs is given.—*Acute Consolidations of the Lung: Their Recognition and Differential Diagnosis, L. R. Sante, Radiology, March, 1925, iv, 221.*—(*H. S. W.*)

Spirochetes in Hemoptoic Tuberculous Sputum.—These studies were carried out at the Hopital Boucicaut and the Institut Pasteur. It was previously shown that: (1) In the sputum of nontuberculous individuals this particular type of spirochete is never found, (2) in the sputum of hemoptoic tuberculous patients it is quite constant; and (3) it has nothing in common with the spirochetes of the upper air-passages. This microörganism measures from 7 to 15 micra in length and has 3 spiral twists. The *Spirocheta dentium* is smaller and more wavy; Castellani's *Spirocheta bronchialis* moves more rapidly and is more truncated. The *Spirocheta buccalis* is transparent only in the centre. This spirochete seems to be intermediate between the two foregoing. Its rôle in hemoptyses in tuberculosis remains to be determined.—*Présence de spirochetes dans les crachats hémoptoiques des tuberculeux, F. Bezançon and E. Etchegoin, Meeting, Section d'études scientifiques de l'Oeuvre de la Tuberculose, March 14, 1925, reported in Rev. de la Tuberculose, June 1925, vi, 377.*—(*A. P.*)

Alveolar Pores of Pneumonia.—This article is a further discussion of the factors leading to the formation of alveolar pores in pneumonia. Pores are formed by the pushing off and shedding of the alveolar epithelium from the accumulation of serum when this occurs on diametrically opposite sides of an alveolar wall. The epithelium which covers the walls of the alveoli is frequently described as being of two types; one made up

of large nonnucleated plates, the other of small nucleated cells which are often arranged in groups. In other words, the epithelium is said to be discontinuous. This, however, is not the case. At birth the epithelial cells are more or less cuboidal in shape and completely line the walls of the alveoli. With the establishment of respiration and the full distention of the lung, they are stretched out into thin squamous cells and their nuclei are often indistinct; as soon, however, as atelectasis takes place, they return to their nondistended condition, and the alveoli are found to be lined with cuboidal cells which, not infrequently, give to the collapsed alveoli the appearance of small bronchioli, from which they can be distinguished by the absence of smooth muscle in their walls. Reproductions of photomicrographs, illustrating the above points, accompany the article.—*The Alveolar Pores of Pneumonia, W. S. Miller, J. Exp. M., December 1, 1925, xlii, 779.*—(*J. S. W.*)

Abscess of Lung.—This study is based on a series of 227 cases of pulmonary abscess. In 78 of the cases the etiological feature was an operation about the upper respiratory tract. Tonsillectomy was responsible for the largest single group, 49 cases. The etiological factors in the remaining 114 cases are less clear. On the whole, the impression is gained from a review of these cases that ingress of infected material from above into the deeper parts of the respiratory tract is to be regarded as the chief cause of pulmonary abscess. The onset is often insidious, and accompanied by gradually increasing cough and expectoration. Aside from its bad odor the sputum presents no special gross features. Malaise, fever, chills and sweats usually occur. There are five cardinal points in diagnosis: (1) Cough and explosive expectoration, (2) foul breath and foul sputum, (3) elastic tissue in the sputum unaccompanied by tubercle bacilli, (4) dulness on percussion over a circumscribed area, and (5) roentgen-ray findings. *Prognosis:* The estimated mortality of abscess, treated by medical means, is about 75 deaths out of 100 cases, and of the remaining 25 about 15 continue to cough and expectorate pus. Recovery without operation may be expected in 10 per cent of the cases. A short previous duration, relatively mild symptoms and an inextensive process at or above the region of the lung root appear to be factors of importance in increasing the chances of recovery without resort to radical measures in treatment. Postural drainage should be given a trial first. Persistence of fever, unabated septic manifestations, and increase in the extent of the process may be taken as indications that radical means should be considered. Improvement in local drainage by bronchoscopic aspiration and lavage, when skilful operators are available, may be considered, especially in deep abscesses near the lung root. Centrally placed abscesses, without pleural involvement, as indicated by lack of pain, and by physical and X-ray examinations, may be regarded as most favorable for trial by artificial-pneumothorax treatment.—*Certain Aspects of Pulmonary Abscess from an Analysis of 227 Cases, F. T. Lord, Boston M. & S. J., April 23, 1925, cxci, 785.*—(*B. T. McM.*)

Empyema in Children.—A study was made of the roentgenograms and clinical aspects of 225 cases of empyema and 100 cases of nonpurulent effusion in children. The difficulties in roentgen diagnosis in these cases are pointed out and useful diagnostic points are given. Among the latter may be mentioned the following: *1:* Asymmetry of the chest, as shown by narrowing of the intercostal spaces on the affected side, and scoliosis of the thoracic spine must be carefully looked for as indicative of small amounts of pus. *2:* The effusions are frequently widespread, but encapsulation along the lateral wall is fairly common. *3:* Displacement of the heart was found in 41 per cent. *4:* One-quarter of the cases had a definite change in shape and density of the shadow when the prone position was assumed. *5:* Consolidation alone caused no asymmetry, scoliosis or displacement. *6:* Radical change overnight suggests consolidation. *7: Streptococcus hemolyticus* effusions may appear simultaneously with or possibly before consolidation. The necessity for careful technique is explained and correct posture when taking the film is emphasized. The importance of reëxamination in doubtful cases is pointed out. Postoperative films are valuable and should be taken at intervals to observe the progress of the lesion.—*The Roentgen Aspect of Empyema in Children, J. R. Carty and C. Liebman, Am. J. Roentgenol, and Radium Therapy, September, 1925, xiv, 215.*—(*E. H. K.*)

X-ray Diagnosis of Bronchiectasis.—There are three types of bronchiectasis: (1) linear, (2) cylindrical and (3) sacculated. The linear type represents the earliest stage of the disease, and is characterized by an increase in the linear markings along the terminal bronchi; it is usually localized, and most commonly seen in the lower lobes. The cylindrical type is characterized in the

roentgenograms by a more marked increase in density along the course of the bronchi, the density being now fan-shaped, and interspersed with clearer areas. The latter areas represent the dilated bronchioles and have the appearance of cavities; they vary greatly in size and number, and can usually be brought out much more distinctly by having the patient empty the respiratory tract of its contained secretions immediately before the roentgen examination. The third or sacculated type represents the most advanced stage of the disease, and is characterized roentgenologically by large pseudocavitation and a marked increase in the fibrous elements of the bronchial tract. In this stage there is usually involvement of the pleura; occasionally, the pleural thickening is so marked as to simulate a chronic empyema. *Conclusions:* 1. The symptoms of bronchiectasis may be extremely indefinite. 2. The diseased respiratory tract of a bronchiectatic patient renders him a poor surgical risk. 3. It is essential to establish the diagnosis of bronchiectasis whenever possible. 4. The roentgen ray will discover and localize bronchial lesions in many unsuspected cases. 5. No other diagnostic agent can so accurately define the lesion. 6. The roentgen ray is particularly valuable in reaching a decision as to giving a prognosis.—*Further Observations on the Roentgen Diagnosis of Bronchiectasis, A. B. Moore and W. J. Marquis, Am. J. Roentgenol. and Radium Therapy, June, 1925, xiii, 527.*—(*B. T. McM.*)

Actinomycosis of Pleura.—Two cases are reported, both patients dying and coming to autopsy. The initial symptoms in the first case, that of a young woman who worked in a drapery shop, were pains in the back and malaise, and the development of left-sided pleurisy and pericarditis. Later a lump appeared above the left breast and there was slight fever. The diagnosis was made by examination of the discharge which followed puncture of this lump. Stained specimens revealed the branching mycelia and spores, and pure cultures were obtained anaerobically in 2 per cent glucose agar. Treatment was of no avail. The suppuration was found to involve all the tissues of the chest-wall as well as the mediastinum, left pleura and pericardium. In the second case also the initial symptom was an attack of pleurisy, which recurred, and then a skin lesion appeared. When seen, there were several typical skin lesions on the right chest-wall. Cough and purulent expectoration developed later, together with involvement of the left side. Examination of the discharge in this case was negative except for the finding of some streptothrix filaments after two weeks. Autopsy showed bronchiectatic cavities of the right lung, which was collapsed and the diaphragm perforated. There were metastatic visceral abscesses containing streptothrix. *Diagnosis:* The possibility of actinomycosis must be considered in the case of a lump of obscure origin anywhere in the chest-wall. It may be possible to decide the diagnosis by exploratory puncture, followed by microscopical examination or culture, the presence of branching filaments in the discharge justifying the diagnosis. *Mode of infection:* The original view of conveyance to man from vegetable sources, is questioned. Colebrook believes the so called *Actinomycosis bovis* to be a frequent inhabitant of the human intestine, and both he and Lord have isolated microörganism of similar appearance from carious teeth. Both inhalation and ingestion infection (from the esophagus) are discussed, but blood-stream infection from an unknown primary focus, probably in the mouth, seems equally likely. *Treatment:* Opinion is divided as to the best method. Good results have been reported from pleural irrigations with collosol iodine and iodide medication, also from colosol iodine intravenously, also from autogenous vaccine, from X-ray therapy, and from surgery. Radiation, iodides and autogenous vaccines yielded no results in these cases.—*Actinomycosis of the Pleura, D. W. Patterson and F. J. Nattrass, Brit. M. J. May 16, 1925, no. 3359, 918.*—(*A. P.*)

Nontuberculous Pulmonary Fibrosis.—This paper is largely devoted to a discussion of the type of pulmonary fibrosis that follows the acute respiratory infections. The diagnosis of the condition is important, for by recognizing the etiology and preventing the contributory factors a large amount of the resulting disability can be eliminated. From the standpoint of the child, at which age the incidence of the disease is greatest, much time lost from school could be prevented. With a more careful differentiation of the cases in the adult many would escape the stigma of being labelled tuberculous. The present study covers a series of 30 cases seen in the wards and outpatient departments of several London hospitals and sanatoria, and includes a review of 2,000 consecutive postmortems. The latter yielded 54 cases of pulmonary fibrosis. Pure fibrosis, without accompanying bronchial dilatation, occurred only once. Tuberculous fibrosis occurred 8 times. The commonest conditions found were fibrosis plus bronchiectasis or bronchiectasis alone. At postmortem these cases

showed a tough contracted lung, with thickened pleura and old adhesions. There is a varying degree of bronchial dilatation, greatest at the base and frequently associated with small abscess cavities. Among children the disease usually begins during the first five years, and the majority of the cases follow whooping cough and pneumonia. In adults, pneumonia and influenza are the commonest causes. The outstanding features in all the cases studied (30) was the recurrent cough, always worse in winter. The cough was productive, but among the children the sputum was seldom foul and never in large amounts. Dyspnea was more common in adults, but never severe. Pulse and temperature were normal and there was no great tendency to wasting. Under physical signs the following were noted: Contraction or flattening of the chest on the affected side occurred 18 times. Displacement of the heart occurred 18 times. Normal resonance of the chest is impaired on the affected side, usually in the lower two-thirds. These have been described as the "noisiest chests" one can listen to. The breathing is usually bronchovesicular or of squeaky leathery type, and râles, when present, are large and moist, and frequently have a metallic note. The roentgen ray is useful in determining the amount of chest contraction and mediastinal displacement. In the lung fields the important points are peribronchial thickening, extending particularly toward the bases, and a diffuse dilatation of the smaller bronchi. There is a varying degree of opacity present, and emphysema may be seen in other parts of the lung. Since the need for the diagnosis of these conditions comes largely during childhood, the Pirquet reaction is valuable. Clubbing of the fingers and toes is an important sign, and it should lead one to suspect bronchiectasis. As a rule, the sputum, when present, is white and mucoid, in contrast to the yellow or greenish purulent sputum of tuberculosis. With regard to the course of the disease and the prognosis, unresolved pneumonias generally show their maximum amount of clearing within twelve or fifteen months after the onset. Any residue after this length of time is usually permanent and undergoes fibrosis. Those patients having fibroid changes ultimately go on to bronchiectasis because of the shrinkage of the fibrous tissue and consequent dilatation of the bronchi. This stage shows a relatively bad prognosis on account of the prevalence of septic complications. The treatment of the nontuberculous fibrosis is usually palliative, although the use of iodides is worth thorough trial. In early cases breathing exercises are of definite value in helping to expend the chest, and the use of the Woulfe bottle is recommended. The importance of a suitable environment in an equable climate is emphasized, and it is urged that children suffering from respiratory conditions be kept in bed until the temperature and physical signs have returned to normal. Artificial pneumothorax and thoracoplasty have been suggested. The separation of the nontuberculous from tuberculous fibroses is the most important problem in the differential diagnosis. A repeatedly negative sputum, a history of respiratory infection, the relatively mild symptoms and lack of disability in proportion to the physical signs suggest the nontuberculous form of the disease. The location of the lesion is important, for it is usually basal in the nontuberculous cases. The roentgen ray is a valuable adjunct in the diagnosis. The "primary foci," the secondarily involved lymph nodes, and the characteristic "fuzzy" opacities of tuberculosis are not seen. The presence of bronchial dilatation is in favor of fibrosis, while true cavitation points to tuberculosis. Unresolved pneumonia must be differentiated from empyema. Other conditions from which this type of pulmonary fibrosis must be distinguished are syphilitic fibrosis, pneumonokoniosis, fungoid growths in the lung and gassing. Instructive case histories accompany the article.—*The Nontuberculous Pulmonary Fibroses, D. W. Atkinson, Am. J. M. Sc., November, 1925, clxx, 693.—(J. S. W.)*

Key to Abstractors

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